

OPPORTUNITIES AND CHALLENGES OF URBAN AND PERI-URBAN FORESTRY AND GREENING IN BANGLADESH: DHAKA CITY AS A CASE

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Preface

Foreword:

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ABSTRACT

This research discusses the opportunities and challenges of the urban and peri-urban forestry and greening (UPFG) in Bangladesh taken Dhaka city, the capital of Bangladesh as a case. The conceptual overview of UPFG, overall description of the present status of green resources in and around Dhaka city as well as current efforts for greening were the background to propose the ways to transforming the mega city Dhaka into a greener tropical metropolis in the long run.

The green resources in Dhaka are overwhelmed by a number of limitation inherent to the exceptional mode of urban development, rapid increase of urban population, transformation of green and other open spaces into other types of land use, lack of proper planning and implementation and management restrictions as well. Nevertheless, this research reveals that there are ample opportunities yet remain to promote UPFG in and around Dhaka. The possible opportunities are to the protection of existing green areas such as parks, garden, play grounds etc., increase roadside, avenue plantation and rooftop gardening, introduce afforestation and nursery activities in newly developing areas in between built up and peri-urban, promote homestead gardening and social or community forestry in peri-urban areas. But several recurrent obstacles must be overcome in the way of the planning and execution of more green areas in urban landscapes. The present study recommends that government should take immediate steps to establish the institutional setup to facilitate the UPFG programmes. A comprehensive and long-term plan coupled with adequate and sustained resource allocation is also the essential factor in UPFG development context. Moreover, coordination amongst concerned ministries and governmental departments, patronization of private-sector, NGOs participation and contribution, enhancement of green awareness of citizen and ensuring their active participation and collaboration with donor agencies can accelerate the greening process through the UPFG conceptual framework in Dhaka as well as other cities of Bangladesh.

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1.1 Introduction

The development of multifunctional urban green structures can be an important contributor to sustainable urban development in terms of improving the quality of life and environment for current urban populations (Konijnendijk *et al.*, 2004). The preservation of vegetated areas, or green spaces, and creating and expanding more green space in and around the cities can improve the quality of life by providing people with natural settings for leisure and recreation, and by safeguarding the quality of precious life-giving resources. Green areas also have the potential for affording citizens the opportunity to get direct economic benefits through urban agriculture or forestry (IADB, 1997).

The concept of urban and peri-urban forestry and greening (UPF) is particularly a promising approach to urban green space planning and management. It focuses on what are perhaps the main elements of urban green structures: forests and other tree dominated vegetation in and around urban centers (Konijnendijk *et al.*, 2004). UPF acts in the interface between urban and rural, dealing with multiple functions of urban green resources (Knuth, L., 2006), whose overall objective is not merely timber production or pure beautification, but a sustained production of environmental, social and economic benefits (Nilsson *et al.*, 2001). UPF thus, is a strategic, integrative, interdisciplinary, and participatory approach (Konijnendijk *et al.*, 2004). The concept of UPF builds on a history of more than 35 years and has its roots in North America and more recently in Europe (Konijnendijk *et al.*, 2004), and, other parts of the world, such as Asia, have also shown interest (Palijon 2002). Recently, UPF has found broad following across the world, but its potential for cities and towns in developing countries is unrealized (Konijnendijk *et al.*, 2004). Although FAO has been trying to promote UPF in developing world since 1990, lack of information and strategic, coordinated action has hampered implementation of UPF in the developing worlds (El Lakany 1999; FAO, 2002). Recently FAO has commissioned a series of studies on thematic issues relevant to the forest sector (Knuth, L., 2006) including urban and peri-urban forestry and greening (UPFG) for West and Central Asia (FOWECA) to indicate emerging opportunities and challenges. A lot of research has been already done on UPFG but most of them are related to in the case developed countries and some developing countries of the world. As the UPFG concept is still under scrutiny for adaptation to local conditions (Konijnendijk *et al.*, 2004), thus development and promoting UPFG in third world developing countries, particularly in South Asian tropical countries is yet a big challenge.

1.2 Statement of the Problem

Dhaka, the capital and the most populated city of Bangladesh, is now a member of the “mega-city” family of the world. Due to rapid and unplanned urbanization, commercial development, along with population pressure, the overall city environment is being worsened seriously day by day. But Dhaka City was once known for its serenity, beautiful parks, clean roads and lush greenery, and the places within the present Dhaka city boundary were forested, but at present those tree cover are almost transformed to urban habitats to accommodate excessive population due to high rate of rural–urban migration. In addition, industrialization in the urban fringe areas and transformation of different land use within the city as well as the surrounding urban fringes caused to the depletion of existing tree covers so rapidly during the last half century. The depletion process of green resources got impetus, as the government

had no long term planning to keep city green except establishment of few parks and road side plantation under the city beautification programme. In some instances, government acted as the clearing agent of the greeneries. On the other hand, people in general are not properly aware of the importance of tree covers' existence in and around their living premises. Moreover, the absence of plantation process of trees in the past sites is also another important reason to remain the diminishing state of the existing tree cover in the city. Now a day, very few green spots exist within city boundary as the reminiscence of past green glory (Islam, 2002).

As the city is, however, in a stage of transition, struggling with the challenges of urban expansion, over population, poverty alleviation and improve the quality of life and environment, all these fact raise the question about the future planning and managing strategies for UPFG in Dhaka city within multiple and rapidly changing urban demands and particularly, what opportunities exist for the development of UPFG and what challenges should be overcome in the future for enhancing the overall urban green resource in and around Dhaka City.

1.3 Research question and Objectives

This research aims to discuss the opportunities and challenges of the UPFG in Bangladesh taking Dhaka City as an example. The present study tries to explore the answers of the following research question:

- What are the potentialities and major challenges for enhancing green structure through the UPFG in Bangladesh?

Thus, the objectives of the study are:

1. To give a conceptual overview of UPFG and its benefits in social, economic and environmental contexts;
2. To discuss the opportunities and challenges of UPFG in and around Dhaka city within the conceptual framework.

1.4 Delimitation

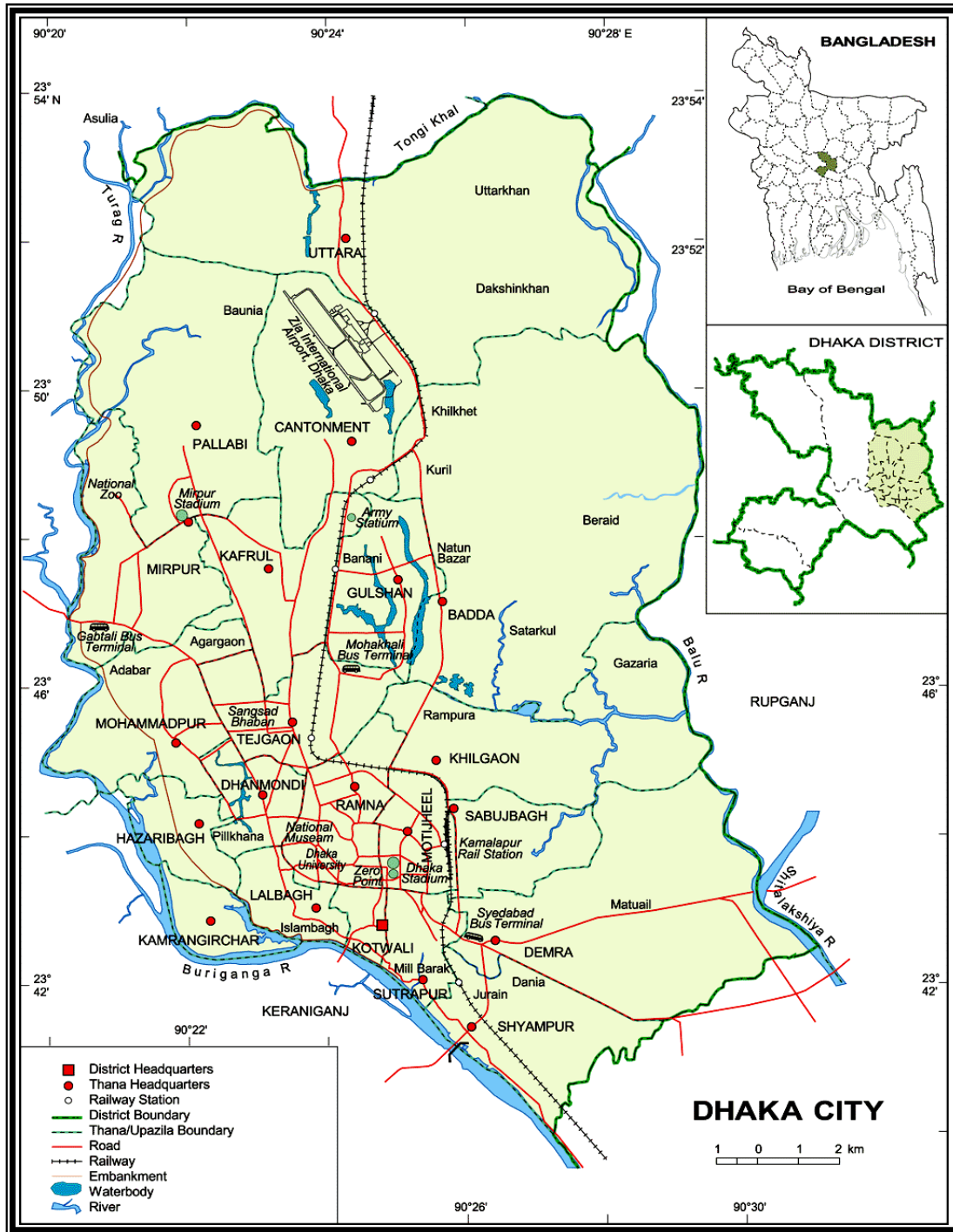
Due to time and resource limitation the result of the report is delimited on discussion of some key opportunities for UPFG in and around Dhaka City taking into account the current problems associated with greening activities and within the UPFG theoretical framework and also discussion on the challenges that must be overcome before the benefits of UPFG can be fully realized.

1.5 Case area description: Dhaka City

1.5.1 Location, Area and Demographics

Dhaka city is located almost the central part of Bangladesh under the Dhaka District. Geographically the city is situated between 23°42' and 23°54' north latitudes and 90°20' and 90°28' east longitudes (Map 1.1). Dhaka mega city, consists of seven principal thanas — Dhanmondi, Kotwali, Motijheel, Paltan, Ramna, Mohammadpur, Sutrapur, Tejgaon — and 14 auxiliary thanas — Gulshan, Lalbagh, Mirpur, Pallabi, Sabujbagh, Dhaka Cantonment, Demra, Hazaribagh, Shyampur, Badda, Kafrul, Kamrangir char, Khilgaon and Uttara. In total the city has 130 wards and 725 *mohallas*. It comprises Dhaka City Corporation (DCC) and five adjacent municipal areas i.e. Savar, Narayanganj, Gazipur, Kadamrasul and Tongi (BBS, 1991). The area of Dhaka mega city is 1,353 km² of which DCC occupies 276 km² (BBS,

2001). Rajdhani Unnayan Kartripakkha (RAJUK) has a Strategic Planning Zone-wise definition of Dhaka city which currently consists of total 26 zones of which 19 may cover Dhaka Statistical Metropolitan Area.



Map 1.1: Location of the study area.

Source: www.dhakadailyphoto.blogspot.com/2007/06/maps-dha...

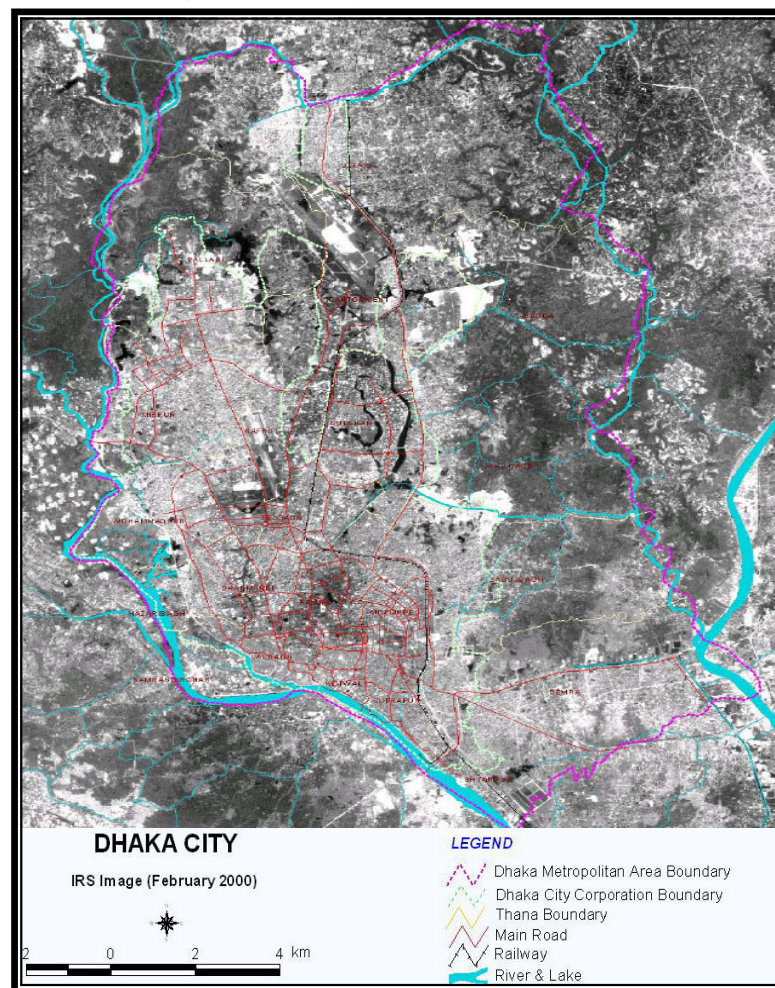
According to United Nation Population Fund (UNFPA) the total population of Dhaka mega city is now over 12.3 million of which population of DCC is about 8.4 million. The population is growing by an estimated 4.2% per annum, one of the highest rates amongst

Asian cities. The continuing growth reflects ongoing migration from rural areas to the Dhaka urban region, which accounted for 60% of the city's growth. The city's population is being also growing with the expansion of city boundaries. The population density of DCC is 19,286 per km² which is more than double of the mega city average of 7,918 per km² (BBS, 2001).

Islam is the predominant religion of Dhaka's people. Hinduism is the second-largest religion and smaller communities practice Buddhism and Christianity. The population literacy rate of the city is estimated at 62.3% (BBS, 2001).

1.5.2 Physical setting and Climate

Dhaka is surrounded by the river Buriganga on the south, Turag on the west, Tongi khal on the north and Balu river on the east (Banglapedia, 2003). In spite of its water confinement on all sides, Dhaka is considerably high above the water of surrounding rivers in ordinary seasons of inundation. The elevation of Greater Dhaka lies between 2 to 13 m above mean sea level (msl). Most of the urbanized area lies at the elevation of 6 to 8 m above msl (Tawhid, 2004) which is flat and close to sea level. The natural drainage system in the greater Dhaka city comprises of several retention areas and khals (channels), which are linked to the surrounding rivers. There are more than 40 drainage channels (khals) in Dhaka including main and branch channels (Tawhid, 2004).



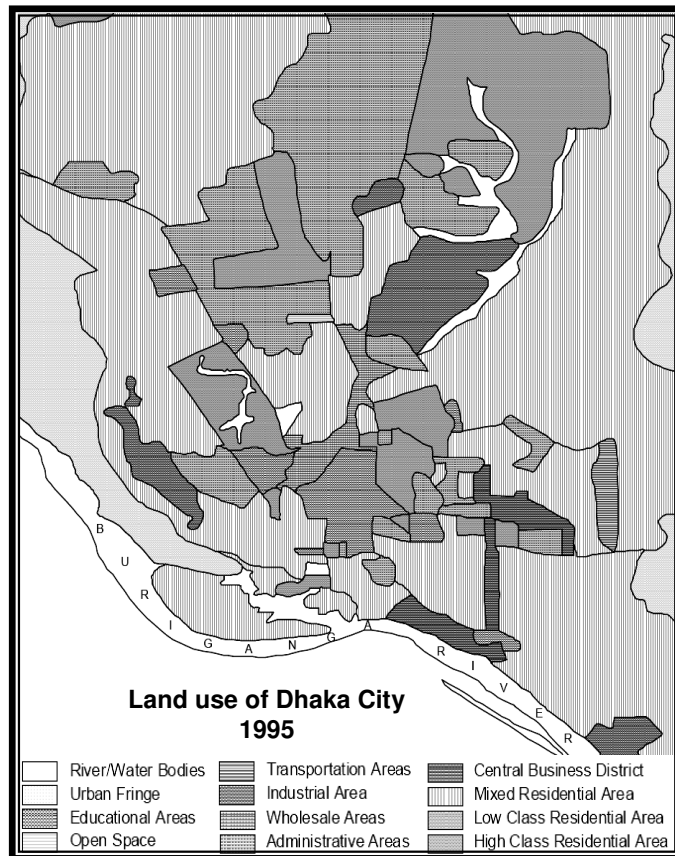
Map 1.2: Built up and adjacent low lying area of Dhaka city.
Source: GIS Division of BCAS, 2004 and modified by the Author.

Moist soils characterize the whole Dhaka city land for which Dhaka is susceptible to flooding during the monsoon seasons owing to heavy rainfall and cyclones. The main vegetation type is tropical in nature. Dhaka's increasing growth and primacy is partly explained by its geographic location. Being centrally located enjoys good accessibility with rail, road, water and air connections with all major towns and cities of Bangladesh (Islam, 2001).

Dhaka experiences a hot, wet and humid tropical climate. The city is within the monsoon climate zone, with an annual average temperature of 25 °C and monthly means varying between 18 °C in January and 29 °C in August. Nearly 80% of the annual average rainfall of 1,854 millimeters occurs between May and September. The city also experiences tornado, thunderstorms and cyclone during the pre-monsoon season.

1.5.3 Land use

Dhaka carries a very long history dating back from the 1600 to present times. But the present city started to develop in a more planned way after 1947 when it gained regional and political importance (Chowdhury, J.U., 1998). Previously, commercial and residential areas were situated side by side, mostly concentrated beside the narrow roads, old Dhaka still presents this situation with a mixture commercial, residential and small industries. After preparation of the Master Plan of the city in 1958, the commercial centers of the city was moved to Motijheel and a high residential area was developed at Dhanmondi. Housing colonies for government employees, universities, parks, commercial and industrial zones, lakes and other public facilities were developed gradually to meet the demands of the expanding city (Tawhid, 2004).



With the development of the city, wide roads and other paved areas replaced the unpaved areas, natural depressions, and agricultural land. In many cases, natural drainage canals and open water bodies were filled up for development works. However the present status of Dhaka city demonstrates that the development of the city did not succeed to fully meet the requirements of a mega city. Absence of adequate parks, open water bodies, and drainage system has degraded the quality of living in the city in many ways (Tawhid, 2004). The present type of land uses of the greater Dhaka city include residential 32%, commercial 4%, agricultural 57%, water bodies 5%, and open fields 2% (Hafiz *et al.*, 1997). However, in the metropolitan city area, the percentage of the agricultural land is much lower (Tawhid, 2004).

Map 1.3: Broad types of Land use in Dhaka city

Source: Tawhid, 2004 and reconstructed by the author.

1.5.4 Economy

Dhaka is the commercial heart of Bangladesh and historically it has attracted large number of migrant workers from all the parts of the country. According to City Mayors Statistics, Dhaka's GDP registered at \$52 billion in 2005 with an annual growth rate of 6.1%. The annual per capita income of Dhaka is estimated at \$550, with many surviving on less than \$3 a day. Hawkers, peddlers, small shops, rickshaws transport, roadside vendors and stalls employ a large segment of the population and half the workforce is employed in household and unorganized labour, while about 800,000 work in the textile industry. Many skilled workers are employed in the businesses and industries located in the Dhaka metropolitan area. Even so, unemployment remains high at 23% (BBS, 2001).

The main commercial areas of the city include Motijheel, Panthapath and Gulshan. Bashundhara City is a recently developed economic area that houses many high-tech industries and corporations and shopping malls. The Export Processing Zone in Dhaka was set up to encourage the export of garments, textiles and other goods. Urban developments have sparked a widespread construction boom, causing new high-rise buildings and skyscrapers to change the city landscape. Growth has been especially strong in the finance, banking, manufacturing, telecommunications and services sectors, while tourism, hotels and restaurants continue as important elements of the Dhaka economy (Wikipedia, 2008).

Although the city has a large middle class population, increasing the market for modern consumer and luxury goods, a large segment of the population yet lives below the poverty line. About 54.85% of the population of this city is below the poverty line with 31.88% below the hard-core poverty line (SDNPBD, 2005) and about 19.8% living in the slums and squatter settlements. The total area or land covered by slums and squatter settlements in Dhaka city was roughly estimated at 1,038 acres or about 4.2 sq-km and on an average a slum cluster occupied 345 acres (SDNPBD, 2005).

1.6 Methodology

The present study has been carried out mainly based on secondary data and information. Due to time limit and resources, no personal visit to the case area has been done. Indeed, this report is a desk study and overall the report is based on material available on the Internet and library as well as personal communication with relevant organizations of Dhaka City.

A conceptual overview of UPFG has been discussed at first in order to gain the proper understanding of different aspects including theoretical framework and comprehensive benefits about UPFG. The book *Urban Forests and Trees* edited by Konijnendijk *et al*, 2005, articles from different issues of the *Journal of Urban Forestry and Greening*, and the *Journal of Arboriculture*, reports from FAO, UNEP and COST Action publication, and lecture materials of the thematic course Urban forestry of UFUG programme were the main source of literature for this purpose. Besides, other relevant literatures have been used collecting through the internet and library. After then an analysis has been carried out on the existing green resources of Dhaka city and its adjacent areas. This analysis has been done by using both maps and description. Some maps were used directly from the collected sources and some were reconstructed by the author. Satellite image from Google earth through internet, available maps collected from internet and personal contact with the officials of DCC and RAJUK have been used. Statistical data, photographs have also been used in support of this discussion. Some photographs represented the different forms of green resources of case area have collected by personal request to author's colleague and others have been collected through internet. Current level of greening activities taken by the different organizations in

Dhaka city has been discussed using the collected annual reports and development plans from DCC as well as Ministry of Forest and Environment through by the personal contact and also the websites of these organizations. After then some important key social and economic problems which are mainly responsible for slow progress of the overall UPFG activities in the case area have been identified and discussed. Maps, statistical data, photographs have also been incorporated in support of discussion. Finally, key opportunities and challenges of UPFG in development context in and around Dhaka city within the theoretical framework and current level situation in the case area have been proposed and discussed. The overall methodological procedure in the present research is given below in Figure 1.1:

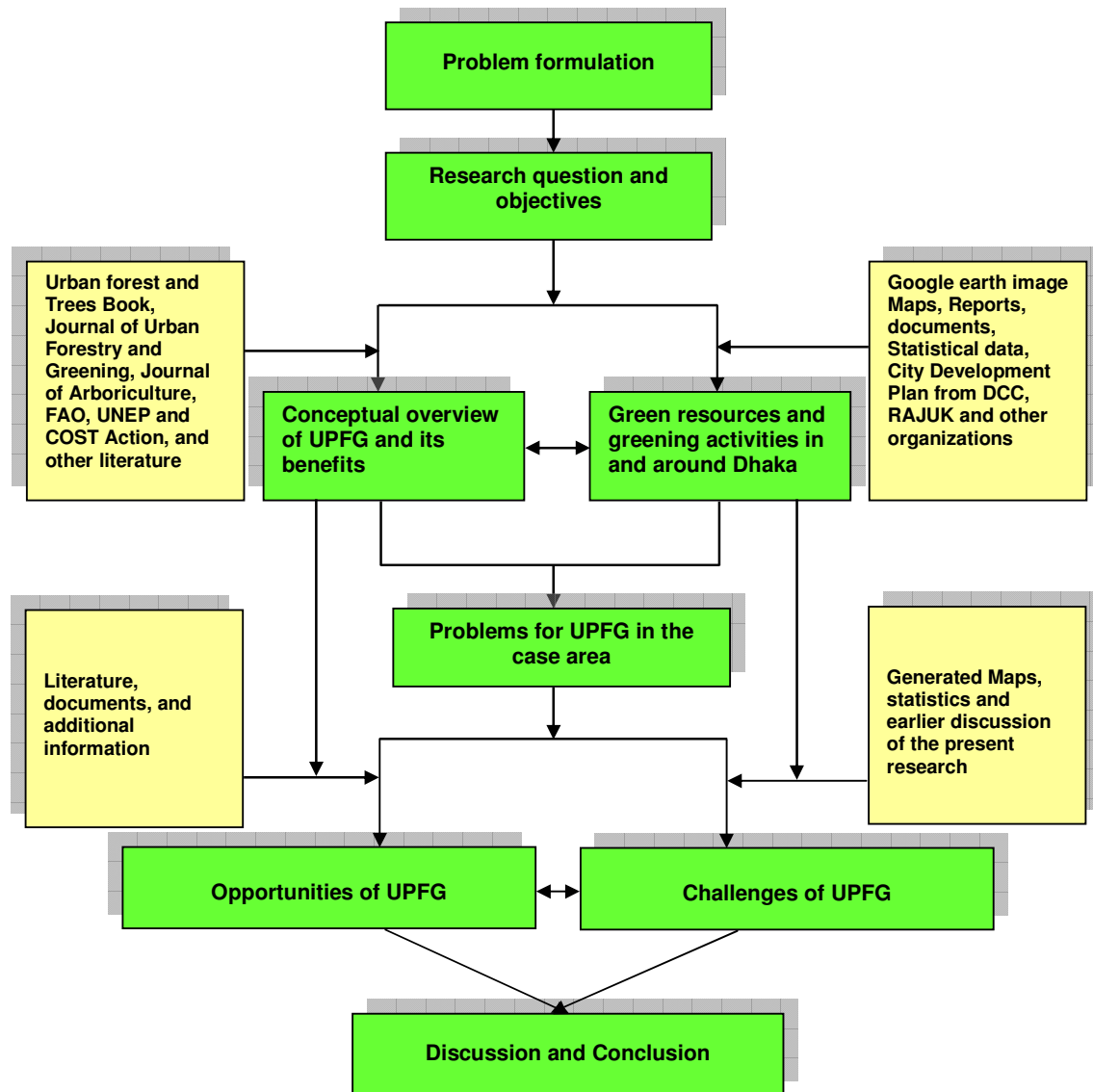


Figure 1.1: Methodological procedure of the study.

As the present research is based on secondary information these may lead to certain limitations. Different organizations show the different figures for the same issues for the same period. Besides, sufficient updated data are not available for all priority issues. Maps and documentation also indicates past record on different issues rather than recent date.

1.7 Structure of the Report

This report has been prepared based on the above methodology and is composed of four chapters with a number of sections and sub-sections and appendixes.

Chapter one outlines the problem formulation, research questions and objectives, an overview of Dhaka city as well as the methodology and structure of the report.

Chapter two divides into two sections. First section provides an overview of UPFG in conceptual and theoretical perspective and describes the benefits of UPFG considering for tropical developing countries. Second section analysis the green resources of Dhaka city including the discussion of current greening activities

Chapter three presents the result of the research. It includes three sections: first section highlights the key problems of UPFG in Dhaka city; second and third sections respectively discuss opportunities and challenges of UPFG in Dhaka city in development context.

Chapter four draws conclusion with a brief discussion about the result. Discussion section also provides a model for UPFG in Dhaka city and recommendations for possible immediate actions in the arenas of policy, research, and action to combat the situation towards sustainable promotion and management of UPFG. In addition to the above mentioned chapters, additional information is provided in appendixes in this report.

CHAPTER TWO

CONCEPTUAL OVERVIEW OF UPFG AND ANALYSIS OF GREEN RESOURCES OF DHAKA CITY

2.A. Conceptual Overview of UPFG

2.A.1 The Development of UPFG Concept

UPFG is one of the approaches that gradually has found recognition internationally. It looks at urban green space from an integrative perspective, considering individual green space elements as part of an integral whole (Miller, 1997; Konijnendijk and Randrup, 2004). It is multidisciplinary, an integrative, holistic approach to the planning and management of all green structure and other tree-dominated in and around cities and towns, aimed at optimising the multiple benefits there green resources provide to urban society. The UPFG includes urban and peri-urban forest in some extent and other green areas both in private and public land. The latter category is of particular importance, as many cities have no public forest area but have a vast amount of parks, gardens, tree-lined streets and squares, undeveloped areas, and so forth (Miller, 1997; Konijnendijk and Randrup, 2002). Indeed, UPFG is relatively new and subjects of ongoing scientific debate on the contents of the concept and related terms (Randrup *et al.*, 2005).

The concept UPFG, mainly, derives from the concept urban forestry which builds on a history of more than 35 years and has its roots in North America. Jorgensen introduced the concept of urban forestry at the University of Toronto, Canada, in 1965 (Jorgensen, 1970; Randrup, *et al.*, 2005). Urban forestry not only dealt with city trees or with single tree management, but also with tree management in the entire area influenced by and utilized by the urban population (Randrup *et al.*, 2005). The new concept also caught on in the United State, where the society of American Foresters initiated an urban forestry working group in 1972 (Johnston 1996). But during the first decades of its history, many different interpretations of the concept of urban forestry have existed and initially considerable opposition from different sides (Randrup *et al.*, 2005), such as, arboriculturists and other green area professionals and foresters were encountered. Nevertheless, gradually, at least the concept found more support from different sides. The government of the United States through its Department of Agriculture's Forest Service recognized the value of the new, integrative concept by establishing a national urban forestry programme with strategies and research programmes (Johnston, 1996). The most commonly used definition of urban forestry is then developed by Miller (1997) as: *'the art, science and technology of managing trees and forest resources in and around urban community ecosystems for physiological, sociological, economic, and aesthetic benefits trees provide society'*.

Though Europe has had a long and rich history of green space design and management (Forrest & Konijnendijk, 2005), urban forestry concept as a scientific domain reached Europe during 1980s firstly in the United Kingdom. Pioneer project for leading this concept was the Forest of London project and another was establishment of twelve Community Forests near major urban centers in England, aimed at forest establishment and management to generate socio-economic and environmental benefits for local community (Johnston, 1996). Urban forestry also reached The Netherlands at a rather early stage; in 1984 a group of Dutch urban forestry researchers promoted the concept following their visit to the United States (Heybroek *et al.*, 1985). Ireland initially was another country to follow Britain in embracing the concept of urban forestry (Randrup *et al.*, 2005), and the first major review of urban forestry in

Ireland was carried out in 1994 (Johnston, 1996). Urban forestry research in Europe as well as efforts to define the concept have benefited, particularly, from recent international networking activities such as COST Action E12 “Urban Forests and Trees” (Randrup *et al.*, 2005). It attempted to develop common understanding of what the concept of urban forestry encompasses (Nilsson and Randrup, 1997). Other examples of European networking have included the annual IUFRO European forum on Urban Forestry set up in 1998, and the European Urban Forestry Research and Information Center (EUFORIC), established as Project Center of the European Forest Institute (EFI) in 2001 (Konijnendijk, 2003; Randrup *et al.*, 2005).

But during the establishment of urban forestry as a known and more widely accepted concept and term in Europe, substantial debate on its definition has taken place (Randrup *et al.*, 2005), and more debate and confusion concerning the concepts of urban forestry and urban forest has occurred (Randrup *et al.*, 2005). Its emergence was initially closely linked to Europe's heritage of ‘town forestry’ and the abundance of urban woodland resources, but later on, European urban forestry has been more diversified (Randrup *et al.*, 2005). It embodies a multidisciplinary approach to the planning and management of all forest and tree resources—ranging from street trees to peri-urban woodlands— in and near urban areas (Konijnendijk, *et al.*, 2005). Moreover, general recognition exists that no single profession can claim urban forestry, as it requires cross-sectoral and multidisciplinary approaches (Konijnendijk, *et al.*, 2005).

In North America, Nowak and Dwyer (2000) described urban forestry goals and outcomes as a range from maintaining a single historic public tree to increasing a city's canopy cover by a specific percentage over a specific period of time (Konijnendijk, *et al.*, 2005). This, rather one-dimensional approach does not reflect the multiple benefits urban trees may have (Konijnendijk, *et al.*, 2005). As a consequence, what urban forestry is remains somewhat elusive in spite of the diversity of opinions in the historical and modern literature (Edwards and Bliss, 2003; Konijnendijk, *et al.*, 2005). On an operational basis, urban forestry remains mostly tree care, protection, and replacement because, perhaps, it still is mostly reactive (Groninger *et al.*, 2002; Konijnendijk, *et al.*, 2005). However, long-term, ecosystem-based approaches to urban forest planning are increasing (Bradley, 1995; Konijnendijk, *et al.*, 2005). Definitions of the urban forest such as the one in the Canadian Urban Forest Strategy (CUFN, 2005) show this more comprehensive focus, by explicitly including ‘non-treed’ green spaces (Konijnendijk, *et al.*, 2005). How one defines urban forestry in North America today may originate one's personal, professional, and political values and motives (Haynes, 2002; Konijnendijk, *et al.*, 2005).

The European research community is also moving towards an understanding of the basic premises of urban forestry (Konijnendijk, *et al.*, 2005). In ‘Urban Forests and Trees’, Randrup *et al.* (2005) showed that some common ground has been found, but that too rigid a definition of urban forestry may not be desirable in order to maintain the rich diversity of approaches in Europe (Konijnendijk, *et al.*, 2005). Randrup *et al.* (2005) also suggested a basic framework for further development of the urban forestry concept in Europe which incorporates a wide range of urban forest locations from paved to unpaved and human activities from design and planning to selection and establishment (Konijnendijk, *et al.*, 2005). In this way it helps define the domain of urban forestry very broadly, recognizing its diverse character. At the same time it is highly inclusive, inviting different professions and perspectives to play an active role in green space development (Konijnendijk, *et al.*, 2005). Table 2.1 provides a comparison of origins and definition of urban forestry and related concepts in North America and Europe.

Table 2.1: Comparison of origins and definition of urban forestry and related concepts in North America and Europe.

	North America	Europe
<i>Origins</i>		
First introduction	First mentioning in 1894; rapid development during 1960s and 1970s.	Main development as an independent (academic) field during 1980s; adapted from North America.
Important historical roots	Shade tree traditions and tree warden schemes.	Town forestry; long history of parks and garden design.
Important driving forces	Need to combat pests and diseases on urban trees.	Search for more integrative approaches.
<i>Definition</i>		
Domain of urban forestry (i.e. the urban forest)	All woody and associated vegetation in and around dense human settlements, ranging from small communities in rural settings to metropolitan areas. Traditional focus on street trees.	‘Broad’ definition similar to North American approach. ‘Narrow’ definition focuses on woodland in and near urban centers (managed for amenity values), based on town forestry tradition.
Multidisciplinary character	Highly multidisciplinary. Arborists have been more prominent than in Europe.	Highly multidisciplinary. Foresters have played an important role from the town forestry perspective.
Multifunctionality	Urban forestry provides multiple goods and services. Environmental services have been given increasing focus (e.g., air pollution reduction, climate moderation).	Urban forestry provides multiple good and services. Social services have been prioritized (recreation, health).
<i>Location</i>		
‘Urban’ defined	Urban has become defined very broadly. Areas in, around and close to cities included in urban forestry.	Urban has become defined very broadly. Traditional attention for peri-urban woodland areas.
<i>Related terms</i>		
Related terms that have emerged	Community forestry is increasingly used, often together with urban forestry.	Community forestry less frequently used. Links to, e.g., green structure planning. Terms such as urban woodland and neighbourwood have come into use.

Source: Konijnendijk, et al., 2005.

As ongoing urbanization has meant that more and more areas have come under direct and indirect urban influence, illustrated by phenomena such as suburbanization and urban sprawl. This makes it difficult to define the geographical limits of urban forestry, as the traditional dichotomy between city and countryside is no longer very real (Konijnendijk, et al., 2005). Moreover, in developed countries UPFG has gained attention during the last 20 years mainly for its social, cultural and ecological benefits, whereas, in developing countries the issues of

livelihood, related to forest products such as timber, fuel wood and non-wood forest products (fruits, nuts etc), and environmental issues, like watershed management and protection from erosion, have gained more attention (Kuchelmeister, 1999). This has resulted in the use of Urban and peri-urban forestry (UPF) as an even more wide-ranging concept in recent time. Thus, Miller (1997) defined UPF as “an integrated, citywide approach to the planting, care, and management of trees in the city to secure multiple environmental and social benefits for urban dwellers.” With the development of the concept of UPF, additionally, a wide range of green space concepts have been developed that have no explicit link to urban trees (Konijnendijk, *et al.*, 2005). ‘Green structure’ and ‘green-structure planning’, for example, are concepts that have become established in many parts of Europe (Sandström, 2002; Tjallingii, 2002; Konijnendijk, *et al.*, 2005). Green structures are seen as networks of green elements, as a physical infrastructure fulfilling many functions, such as playing a role in water management, protecting biodiversity, and providing a social infrastructure for leisure and the like (Werquin *et al.*, 2005). Very much in line with this integrative perspective, ‘green infrastructure’ refers to the functioning of the green structure, which provides various services in line with other ‘hard’ types of urban infrastructure (Davies, 2005; Konijnendijk, *et al.*, 2005). Another comprehensive concept that has emerged recently is that of ‘urban greening’, originally defined in terms of ‘greening’ of cities with green space to improve their quality of life and environment (Kuchelmeister, 1998; Randrup *et al.*, 2005). This concept has been, gradually incorporated with most recent emerged concept Urban and Peri-urban forestry (UPF) and FAO is playing a great role to introduce this integrated wide concept as Urban and Peri-urban Forestry and Greening (UPFG), particularly, for developing countries. By gathering world expertise, knowledge and best practices, FAO helps promote UPFG with special attention to poverty alleviation, food security and environmental sustainability. FAO assists countries in developing national and local strategies, legal and institutional framework and programmes that ensure harmony between sectors, disciplines and institutions. FAO promotes the optimization of trees and forests for a healthy green city designed and managed in response to its specific socioeconomic identity, and its landscape and ecosystemic context. Some major forum where FAO is an active actor and could raise UPFG in the international agenda, are the UN Convention to Combat Desertification (UNCCD), the Mountain Forum, the UN Framework Convention on Climate Change (UNFCCC) and UN-Habitat and its World Urban Forum.

2.A.2 Definition and framework of UPFG

Though UPFG focuses on what are perhaps the main elements of urban green structures: forests and other tree dominated vegetation in and around urban centers, it has also a wide variety of definitions. Therefore it is important to be aware of the interpretation of the terminology by the respective user.

Grey and Deneke (1986) provided a more elaborate definition: “Urban and peri-urban forestry is defined as the planned, integrated, and systematic approach to the management of trees in urban and peri-urban areas for their contribution to the physiological, sociological, and economic well-being of urban society.

The FAO term Trees Outside Forests (TOF), referring to all trees that are not in forest, forest lands and other wooded lands in a rural and urban context, are indeed on agricultural and built-up areas and part of all above-mentioned urban green resource elements (FAO, 2002a).

According to the broad definition of UPFG provided in the regional FOWECA report, UPFG refers to all activities related to the *urban green resources* as a whole.

Therefore, urban greening refers to any vegetation effort including the planting of trees, shrubs, grass, or agricultural plots whose design is intended to improve the environmental quality, economic opportunity, or aesthetic value associated with a city's landscape. Urban greening is seen as a strategy for simultaneously making our cities more enjoyable, livable and sustainable.

UPFG acts in the interface between urban and rural, dealing with multiple functions of the urban green resource, in which several disciplines and professions are involved. UPFG could be described as the activities with the overall objective not that of timber production or pure beautification but, through a balanced structure of age and species, a sustained production of environmental, social and economic benefits (Nilsson *et al*, 2001). The strengths of the concept of UPFG include being:

- integrative, incorporating different elements of urban green structures into a whole (the “urban forest”);
- strategic, aimed at developing longer-term policies and plans for urban tree resources, connecting to different sectors, agendas, and programs;
- interdisciplinary, involving experts from natural as well as social sciences;
- participatory, aimed at developing partnerships between all stakeholders; and
- aimed at multiple benefits, stressing the economic, environmental, and socio-cultural goods and services urban forests can provide.

But which parts of green space are seen as the domain of UPFG? What areas does UPFG encompass? As urban forestry is multifaceted, it deals with woodlands, groups of trees, and individual trees where dense conglomerations of people live, involves a wide variety of habitats (streets, parks, derelict corners, etc), and is concerned with a great range of benefits and problems. Within the concept of UPF, the mentioning of “peri-urban” stresses the inclusion of tree resources outside—but close to—urban areas, because these are major contributors in terms of goods and services to urban societies (Konijnendijk, *et al.*, 2004). Within the framework of UPFG, thus urban green resources comprise all green elements under urban influence such as:

- Street trees and road plantations
- Public green areas such as parks, gardens, cemeteries
- Semi-private space such as green space in residential areas and in industrial or specially designated parks
- Public and private tree plantations on vacant lots, in green belts, woodlands, rangeland, and forests close to urban areas
- Natural forest under urban influence, such as nature reserves, national parks, forests for eco-tourism

The scope of UPFG is summarized in Figure 2.1.

	Urban and Peri Urban			Rural	
	Individual Trees		Woodlands	Individual Trees	Woodlands
	Street and roadside trees inside urban areas and at the urban fringe	Trees in parks, private yards, cemeteries, fruit trees etc., inside the urban and at the urban fringe	Forest and other wooded land in urban areas and at the urban fringe, including natural forests and plantations and other wooded land	Shelterbelts, trees in between lots, 'parkland trees' etc., in rural areas	Forests and other wooded land (both natural and planted) out side urban areas and the urban fringe
Form, Design, function and policies					
Technical aspects, (e.g. selection of plant material, establishment methods)					
Management aspects					

Figure 2.1: The Urban/peri-urban/rural forestry matrix (modified after Konijnendijk and Randrup, 2002, FAO, 2002). The grey shade area represents the domain of UFUG.

In terms of UPFG, the Matrix includes different types of urban forest location ranging from single street trees to forest area under the urban influences and the how different tree dominated structures are deal with in planning, management, research or any other activity. As shown, these activities are all part of an overall and integrated set of actions (Randrup, *et al.* 2005).

2.A.3 Benefits of UPFG

Urban green areas, like urban parks, vegetated areas, woodlands, even forest in most cities of the developed countries have traditionally been viewed principally as recreational amenities. In poorer and developing countries urban forestry must first pay attention on assisting in fulfilling basic necessities (Kuchelmeister 1998). Thus, UPFG comes from the recognition that such urban green areas can and should be used in an integrated, holistic manner for many other environmental and social benefits beyond recreational use and aesthetics in developing countries. These include improving basic sanitation, providing potable water, controlling floodwaters, treating sewage, reducing air pollution, disposing of solid wastes, moderating both macro- and microclimates, increasing biodiversity and alleviating poverty. While no single solution will solve all of the city's problems, UPFG takes certain steps to reduce some of the problems outlined above. The following section presents a brief discussion on the benefits of UPFG, particularly, for developing countries under the headings economic and livelihood benefits, Environmental and biodiversity benefits, and social and cultural benefits.

2.A.3.1 Economic and Livelihood benefits

In many developing countries large parts of the urban population are still heavily dependent upon fuel wood (Kuchelmeister, 1998) for their domestic energy needs. Urban and peri-urban plantations and green areas can provide wood and non-wood forest products such as mushrooms, berries, (medicinal) herbs, rattan, and so forth. Focus in the Western world has been on additional economic values such as green areas contributing to more attractive cities for people to work, live and relax. Studies in Denmark and Finland, for example, have shown the positive impact of nearby forests and green on house prices (Anthon and Thorsen, 2001).

The beautification of Singapore and Kuala Lumpur, Malaysia, was one of the factors that attracted significant foreign investment that assisted those cities rapid economic growth (Braatz, 1993). In addition, rehabilitating lands with vegetation is often more attractive and cost-effective than constructing new buildings on them.

2.A.3.2 Environmental and biodiversity benefits

The UPFG can play a major role in improving urban environmental conditions and safeguarding biodiversity (Tyrväinen *et al.*, 2005). Trees and other vegetation intercept particles and gaseous pollutants (McPherson *et al.*, 1997; Harris *et al.*, 1999). Moreover, they act as carbon sinks that help mitigate global warming (McPherson and Simpson, 1999). Important in both the developed and developing world is the role urban vegetation plays regarding water (Konijnendijk, *et al.*, 2004). Trees reduce storm water runoff and can assist with processing wastewater, for example, where other wastewater facilities are insufficient (El Lakany, 1999). Many cities have established and conserved forests for protecting their drinking water resources (Konijnendijk, 1999). Urban green protects soils and moderates harsh urban climates by cooling the air, reducing wind speeds, and by shading. In arid regions, forest shelterbelts around cities help combat desertification and dust storms, as the examples of Burkina Faso (Kambou, 1992) and China (Lu and Wang, 2003) show. The level of biodiversity of urban green areas is often surprisingly high, representing nature close to where people live (Konijnendijk, *et al.*, 2004). Cities such as Kuala Lumpur, Rio de Janeiro, and Singapore (Chin and Corlett, 1986; El Lakany, 1999; Webb, 1999) still have tracts of tropical rainforest within their boundaries.

Urban green areas provide habitats for a surprising number of species and for large populations of birds and animals. Where more parks and vegetation exist, local and migrating species can find suitable habitats. In particular, suburban wetlands may offer some of the world's most productive natural ecosystems as transitional areas between terrestrial and aquatic environments (Bernstein, 1994). Wetlands that are incorporated into urban greening projects, including those designed or maintained for flood control and wastewater treatment settling ponds, provide particularly important habitats for local and migrating fauna contributing to maintaining a healthy biodiversity in the area (IDB, 1990). Besides, greenbelts and greenways can provide biological corridors for wide-ranging species of plants and animals from the surrounding bioregion, allowing them areas large enough to disperse their genetic material, a process crucial to species survival. Urban agriculture can also provide biodiversity on a small but important scale. Diversity protects wild and domestic species from adverse conditions (including natural and economic fluctuations) and thus ensures survival (IDB, 1997).

2.A.3.3 Social and cultural benefits

In many developing countries, trees often have cultural and spiritual values (Seeland, not dated; Konijnendijk, *et al.*, 2004) that could assist new urban dwellers in finding their place in cities and towns. Besides, Green areas provide recreational sites, especially for lower income residents who tend to frequent city parks more than wealthier citizens because of financial constraints and restrictions on leisure time. The urban poor generally have few affordable options for recreation, and thus place a high value on green areas. While not considered as important as filling basic needs such as food and shelter, the aesthetics of green areas can also be very meaningful to many urban residents. Vegetation reduces sun glare and

reflection, complements architectural features and tones down the harshness of large expanses of concrete (IDB, 1997).

Urban green can have a positive impact on physical and mental health, by providing settings for physical exercise and cultural and spiritual values (Seeland, in press). Parks and other green areas also provide educational opportunities for urban residents. For urban children, as well as adult students, the learning experiences available in urban parks may be some of the few opportunities they have to learn about nature through first-hand experience (IDB, 1997).

Finally, it can be said that the range of benefits that urban greening provides is both practical and comprehensive and addresses many of the social, environmental and economic problems most cities face. Though not the panacea for every current urban ill, urban greening nonetheless can significantly treat a great many of them and create a much more salutary and desirable environment in which to live.

2.B. Analysis of Green Resources of Dhaka City

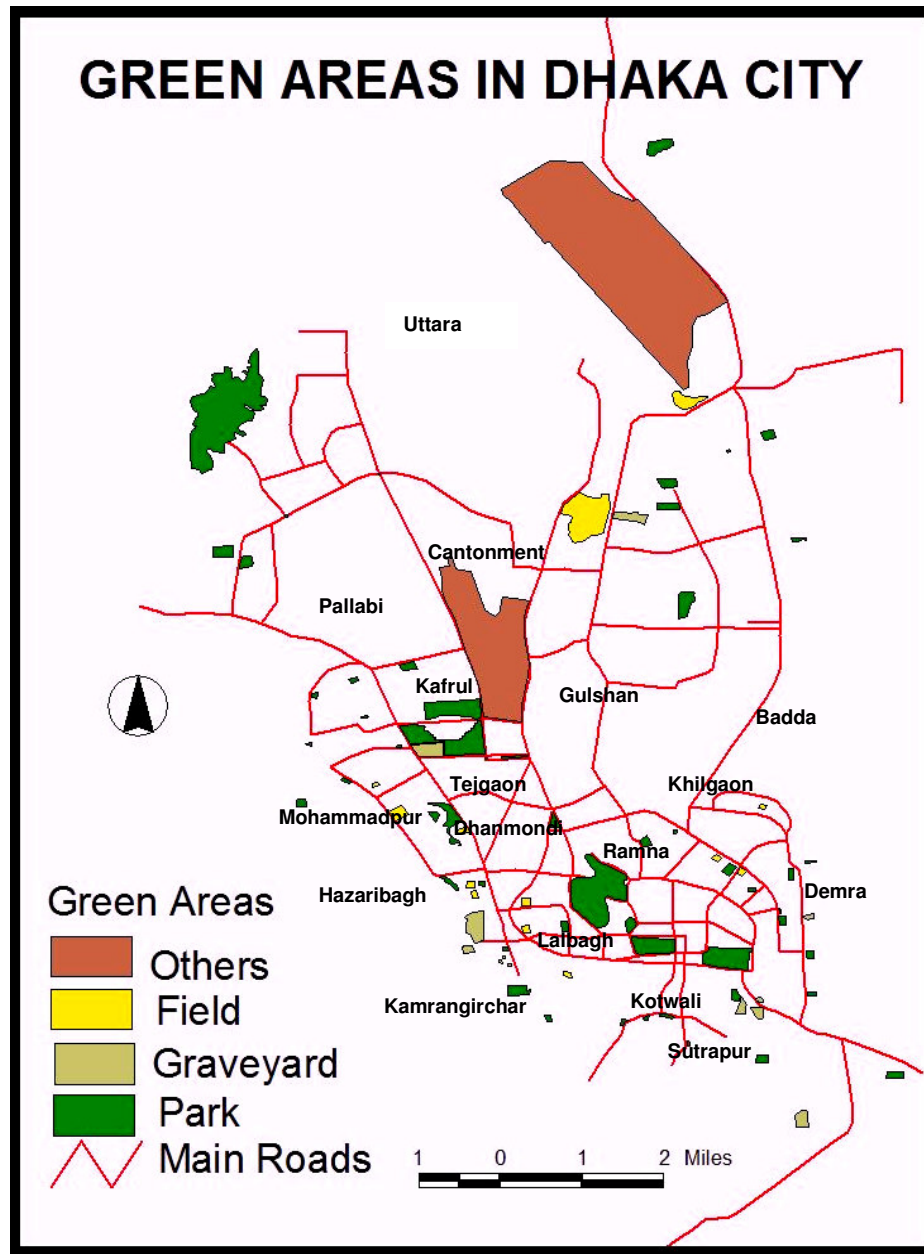
2.B.1. Greeneries in Dhaka City

The professional concept of UPFG is yet not been established as a scientific domain in Bangladesh, although there has been range of activities, involving various areas of forestry, tree plantations, establishing parks and gardens, landscaping, nature conservancy etc. which overlap in a general way. Most green spaces are formed from preserved natural vegetation or created parks or gardens. In a broader sense, urban green resources in Dhaka city refers to all urban and peri- urban vegetation. Due to high density of population and high share of spaces, green resources include both public and private green spaces. Most of the green areas are managed by the local authority except private gardens, nursery, agricultural land and fruit and other trees within the home premises. At present no private owned forest is present in and around Dhaka city.

Generally, the green areas within the Dhaka city and its periphery broadly part of the open space. According to the statistics of Sustainable Development Networking Programme, Bangladesh (SDNPBD), 2005, the open space in Dhaka city is accounted only 21.573 % of its total area. As agriculture is most dominant activities in Bangladesh, it comprises the highest proportion of open spaces that was about 12.12%. That's why agriculture is not a part of green resources of Dhaka city. Thus, green resources in point of view of UPFG in Dhaka city comprise:

- Trees along the streets, paved paths in commercial and residential areas, car parks etc.
- Parks inside the town used for recreational purposes and generally consisting of different areas
- Public and private Garden, graveyard, nursery, zoo, sports fields etc.
- Other types of green areas may be within public or private areas.
- Larger green areas or National Parks outside the city but within the periphery, with some recreational use, mainly visited during holidays and weekends.
- Woodlots, social or community forest areas in peri-urban.

Therefore, green resources can be defined as trees or tree stands within the legal boundaries of DCC with the purpose of providing amenities for the population; namely shelter, recreation, landscaping, beauty etc. and additionally, both public and privately own large green areas, woodlots, social or community forest areas in the peri-urban areas of DCC for recreation and mostly timber, fuel wood and other products purposes. Figure 2.2 and 2.3 show the major green areas in DCC and vegetation covers in the outskirts of Dhaka city respectively.

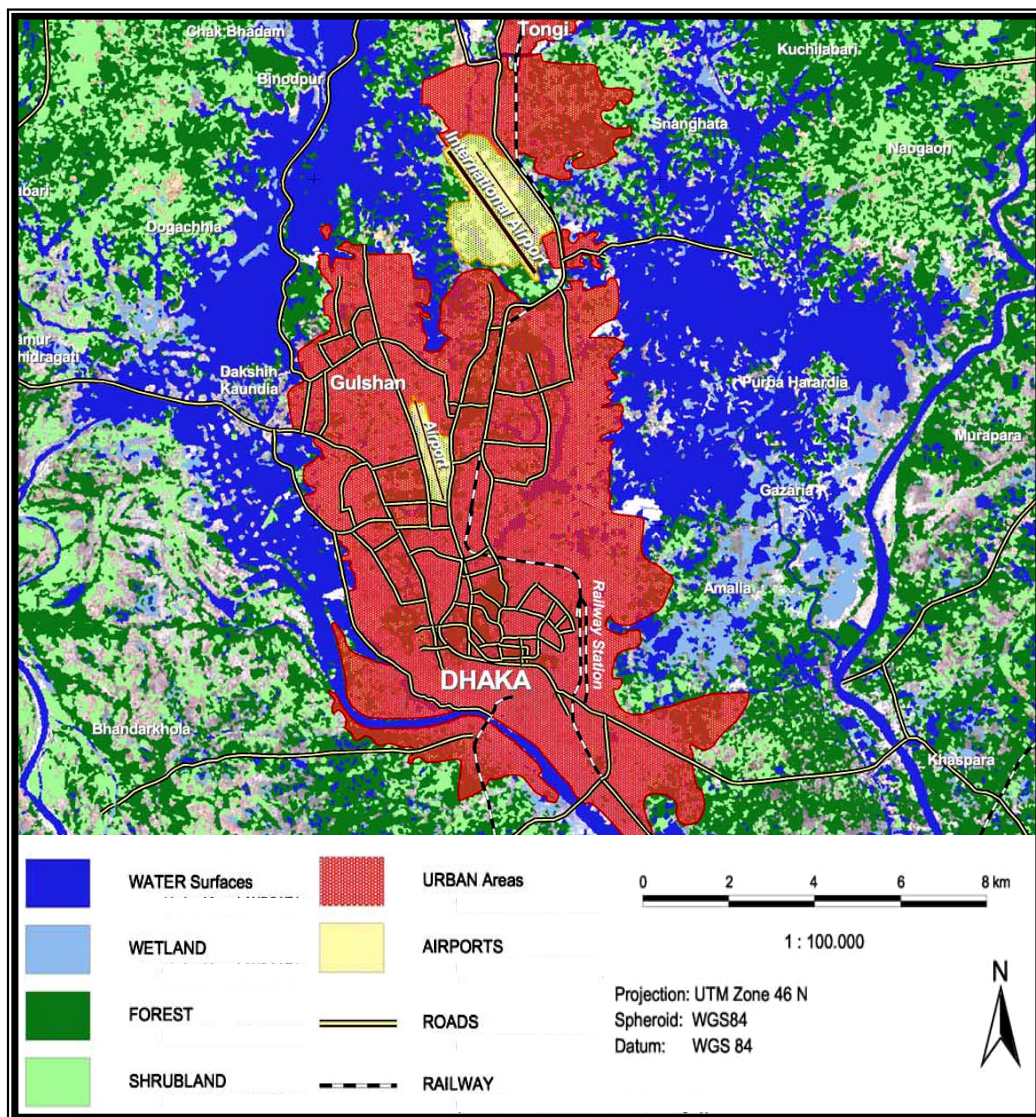


Map 2.1: Green areas in Dhaka city.

Source: Map has been drawn by the author on the basis of Google earth image, 2008 and information collected from DCC.

Map 2.1 excludes privately owned green areas, road side, commercial or residential areas trees or trees stands and wetlands vegetation cover as there is no exact area wise statistics for

the percentage of trees in the city and also no area wise planning for tree plantation. It can be seen that the northern side of the city has very few green areas. Most of the parks are exist in the middle and south western parts of the city. The urbanization of Dhaka started from these area and now is recognized old part of Dhaka. When the British ruled in Dhaka, they established many parks and gardens in Ramna, Dhanmondi and Kotwali areas. These parks are yet reflecting the green glory of Dhaka. Most popular parks like *Ramna Udyan* (Ramna Park) *Suhrawardy Udyan* (Suhrawardy Udyan Park) and Dhaka University campus, *Osmani Udyan*, *Gulistan Park* are the most important green spaces in this area. Besides, some tourist spots such as National Parliament Building, *Chandrima Park*, *Bahadur Sah Park*, Botanic garden and Zoo and some educational institutes, Prime Minister's Office, Dhaka Cantonment etc. which can be considered as important urban green areas located at different part of the city. Moreover, the low lying areas of Dhaka city in the east and western side have some green spaces which are mainly comprise water tolerant trees.



Map 2.2: Green areas in outskirts of Dhaka city.

Source: Center for satellite based Crisis information, 2004 and then reconstructed by the author.

Green areas in the outskirts of Dhaka city are more prominent than the DCC area (Map 2.2). The surrounding areas like Savar upazila, Sonargong upazila, Gazipur and Manikganj districts are mostly green as these areas are still in transition from rural to urban. Woodlots, social or community forest area, homestead gardening, roadside trees are major forms of green resources of these areas. In addition, *Bahwal* National Park is located in Gazipur, only km far away from Dhaka city. It is dominated by *Sal* trees, which is popularly known as *Sal* forest. Following a discussion is done on the major forms of green resources in and around Dhaka city:

2.B.1.1 Trees in streets, paved paths in commercial and residential areas, car parks etc.

These green areas comprise all trees in all roads, including Dhaka bypass, city protection embankment, banks of the *Buriganga* river, lakes as well as other suitable places including office premises, staff quarters and fallow lands etc. Unfortunately, there has yet not been carried out any tree inventory in the DCC area both for public and private areas.

Trees in the street, paved paths in commercial and residential areas differ from place to place within the city. Highly busy areas are mostly treeless, but newly developed residential area or commercial premises are greener than that of the other parts of city. Industrial area like Tejgaon is almost tree less. Though along the *Buriganga* river and DCC protection embankment a number of trees were planted, due to proper maintenance, most of them have been felled by the local poor people. Rests of them are now in very bad condition.



Photograph 2.1: Trees status in street, residential and commercial areas and along the flood protection embankment of Dhaka city (a. Busy area is almost tree less; b. trees in newly developed commercial area; c. trees in high class residential area; and d. insufficient trees along the embankment).

Source: <http://dhakadailyphoto.blogspot.com>.

In 2002, Dhaka City Corporation (DCC) was able to plant only 29 thousand trees out of the targeted 45 thousand because of lack of empty space and in 2003, DCC has planned to plant six thousand trees to replace those that have been uprooted, and a further ten thousand in whatever empty space is available in Uttara and Mirpur area of Dhaka (www.thedailystar.net/2003/06/11).

2.B.1.2 Parks inside the town

Among the parks within the DCC boundary, *Ramna*, *Suhrawardy* and *Osman Uddyan* are most famous parks. The present shape of *Ramna* Park was drawn up in 1952 by the then C & B Department (now PWD) and the lake was excavated and extended. The park now covers an area of 68.50 acres of which the lake takes 8.76 acres. *Ramna* Park now boasts with 71 species of flowering plant, 36 species fruit bearing plant, 33 species medicinal plant and 41 species of forestry and 11 other species. Other popular parks are *Suhrawardy Uddyan* and *Osmany Uddyan* sits in the heart of Dhaka city. Important offices, commercial and trading centers are all located around them. *Osmany Uddyan* is a divider between old and new Dhaka. The new well-liked park is *Chandrima Uddyan* located near the National Parliament Building.



Photograph 2.2: Views of popular parks in Dhaka city (a. *Ramna* Park; b. *Suhrawardy Uddyan*; c. *Osmany Uddyan*; and d. *Chandrima Uddyan*).

Source: <http://dhakadailyphoto.blogspot.com>.

Besides the above mentioned parks, DCC has developed 53 parks within its jurisdiction boundary; those are situated in different parts of the city. The important parks are as follows:

Table 2.2: List of the DCC developed parks.

Sl	Park Name	Area (in Acr.)
1	Banani Sishu Park	1.14
2	Banani Park	0.9060
3	Banani Sishu Park	0.5670
4	Banani Sishu Park	1.23
5	Banani Lake Park	2.75
6	Kamal Ataturk Avenue Park	0.6
7	Baridhara Park	2.2679
8	Baridhara Nursery Park	2.7089
9	Gulshan Park	8.97
10	Gulshan Central Park	7.6160
11	Gulshan Taltola Park	6.1 3
12	Jatrabari chourasta Park	1.2
13	Bahadur Sah Park	0.06
14	Saidabad Park	0.0450
15	Samibagh Park	1.35
16	Gulistan Park (Sahid Motiur)	3.5
17	Siraj ud Doula Park	0.85
18	Jogonnath Sah Road Park	0.63
19	Hazaribagh Park	2
20	Nababgonj Park	0.5
21	Shyamoli Park	3.57
22	Sahid Makil Park	1.98
23	Shia Mosque Park	1.25
24	Iqbal Road Field Park	1.6070
25	Shyamoli Sishu Park	1.5
26	Kawran Bazar Park	0.52
27	Firm gate Trikon Park	0.05
28	Pantho Kunja Park	3.0
29	kolabagan Lake Circus Park	3.7175
30	Najirabazar Park	0.22
31	Malitola Park	0.33
32	Bongshal Triangle Park	0.03
33	Pallabi Sishu Park	0.70
34	Tree Uddayan	0.33
35	Narinda Sishu Park	0.33
36	Narinda Sishu Park	0.1798
37	Bashir Uddin Sardar Park	0.20
38	Khilgaon Sishu Park	0.65
39	Outfall Staff quarter Sishu Park	0.33
40	Mirpur 1 no Round about Park	0.05
41	Motijheel Park	0.33
42	Wonderland Park	2.5
43	Ser sahsuri Lane Park	1.87
44	Udoyjol Field	1.229
45	Mohammedpur Tajmohol Road Park	0.785
46	Dhanmondi Park	4.4982
47	Lalmatia D Block Park	1.184
48	Dhanmondi 3 no gate park	0.8484
49	Hazaribagh Kasaitola Park	0.4269
50	Phulbaria Park	0.0698
51	Bokshibazar Park	0.278
52	Nimtola Park	0.0391
53	Central Sishu Park	--
	TOTAL	79.0285

Source: DCC Annual Report, 2006.

From the above table it is found that most of the parks are very small in terms of size and the total area of these newly developed parks is only 79.0285 acr. Any one can easily understand that these parks are not enough at least, for 12 milion people of the city. Some cases, DCC did not complete the establishment works, just hang a signboard. Besides, lack of proper maintenance most of the parks are under threat of different activities, such as, felling of trees, digging, and illegal/forcible occupation of open space by mini-buses and trucks and vendors. Though DCC claimed that most of the parks are undergoing a cosmetic change, nothing tangible is yet to be seen except felling of trees and excavation here and there.

2.B.1.3 Public and private Garden, graveyard, nursery, zoo, spots field inside the town

There are two Public gardens in DCC. These are National Botanical Garden and *Bolda* Garden. The National Botanical Garden was established in 1961 covering an area of about 84 ha of land located at Mirpur, about 10 km from the city center. The garden houses nearly 50,000 species of trees, herbs, and shrubs including a large collection of aquatic plants. Many exotic plants have been introduced in the garden and acclimatized, and are routinely propagated under the local climatic conditions. Rare and exotic plant species also found in the garden. Another popular Garden named *Bolda* Garedn, a miniature botanical garden in old Dhaka having a rich and rare collection of plants from 50 countries established in 1909. It took more than three decades to give a full shape to this garden. The garden housed about 15,000 plants covering more than 600 species of around 335 genera belonging to 87 families. Among those, the famous Baobab plant (*Adansonia digitata*) was collected from Africa and adapted in this garden.



Photograph 2.3: Views of popular gardens in Dhaka city (a. National Botanical Garden; b. *Bolda* Garden).

Source: <http://dhakadailyphoto.blogspot.com>.

There is no statistics on private allotment garden areas in DCC. Private gardening mainly occupies the front areas or the roof of the dweller houses. Rooftop gardening is becoming very popular in Dhaka as city dwellers desperately seek respite from the monotonous gray cityscape devoid of greeneries. Most of the people who have enough space in their home premises mainly planted fruit trees or flowering. Homestead gardening in the peri-urban areas mainly contains fruit trees and vegetable cultivation. Besides, People outside Dhaka are choosing mostly medicinal, fruit and timber plants. Exotic and hybrid plants however, are gradually outnumbering local species.

Dhaka City Corporation maintains 5 burial grounds for Muslims, 2 Christian Cemetery and 2 burial places for Hindus. The total area is 120.02 acres which is bigger than the DCC developed parks area. These areas are also a significant part of the greenery of Dhaka city.



Photograph 2.4: Greenery of graveyards in Dhaka city (a. front view of Banani Army Graveyard; b. Narinda Christian Cemetery).

Source: <http://dhakadailyphoto.blogspot.com>.

Around 1,200 big and small nurseries are currently operating in Dhaka, its outskirts and neighboring areas including Gazipur, Savar and Ashulia. About 500 of them are exclusively growers who sell the plants to others. Mirpur, Dhanmondi, Gulshan, Sher-e-Bangla Nagar, Khamarbari, Ramna and Doel Chatter are among the city areas where nursery trade is growing (<http://www.thedailystar.net/story.php?nid=32862>).



Photograph 2.5: Street Nursery (a) and Stadium (b) in Dhaka city.

Source: <http://www.thedailystar.net/story.php?nid=32862>
<http://dhakadailyphoto.blogspot.com>.

There are only one public zoo exists at Mirpur, about 16 km NW from the city center called Mirpur Zoo, on 230 acres of land. With different types of animals, colorful and attractive collections of different local and foreign species of tree species are available here. There are 5 stadiums in DCC but these are mainly open grass land with few trees surrounding them. Besides, City Corporation maintains another 11 playgrounds, located at the different parts of the city.

Table 2.3: List of the playgrounds under DCC.

Sl	Field Name	Area (in acre)
1	<i>Bangladesh Field</i>	1.98
2	<i>GolapBagh</i>	2.80
3	<i>Basabo Field</i>	2.50
4	<i>Lalbagh Soshanghat Play Ground</i>	0.33
5	<i>Killar Mor Play Ground</i>	0.40
6	<i>Dhanmondi Play Ground</i>	2.00
7	<i>Kolabagan Play Ground</i>	2.50
8	<i>Banani Play Ground</i>	2.50
9	Gulshan Central Park	3.30
10	<i>Freedom fighter Sadek Hossain Khoka Play Ground</i>	0.96
11	<i>Dhupkhola Play Ground</i>	6.93

Source: DCC Annual Report, 2006.

Most of the playgrounds are very small in terms of size which are not sufficient to accommodate children living near by the playground.

2.B.1.4 Other green areas

Other green areas comprise the small and large public places in Dhaka City. Among them *Bango Bhabon* (Residence of the President of Bangladesh), National Parliament Building, Prime Minister's Residence and Office area, airports, museums area, *Bangla* academy, few historical area like *Lalbag* Fort and educational institutes are most popular green areas.



Photograph 2.6: Views of some green areas in Dhaka city (a. National Parliament Building; b. Dhaka University; c. Jahangirnagar University; and d. *Lalbag* Fort).

Source: (a), (c) and (d) <http://dhakadailyphoto.blogspot.com>.
 (b) <http://banglapedia.net/Images/CurzonHall.jpg>

Within the city, Dhaka university area contributes a large green area and a pleasant place for many visitors at the weekend or any special occasion. On the other hand, Jahangirnagar University, located at the peri-urban area, about 30 km far from the DCC is a 700 acre beautiful green areas. There are a very good number of schools and colleges in DCC which also contributes good portion green areas.

2.B.1.5 Larger green areas and National Parks outside of the city

There are few large green areas located outskirts of the Dhaka city. Some are under the Dhaka district and other are located nearby district. National Memorial, located in Savar, in the suburb of Dhaka city is the very popular area which has vast open space and a good number of trees. This is maintained in proper way. Other important green areas are *Bhawal* National Park and *Modhupu* National Park. *Bhawal* National Park was established in 1974 with an area of 5022 hectares in Gazipur District, about 40 Km far from Dhaka city. This park has a good number and wide varieties of trees and open space. *Modhupur* National Park is the part of *Modhupu Sal* Forest (third biggest forest in Bangladesh), located in Tangail and Mymensingh districts. The total area of the *Modhupur* National Park is 8,436 hectares.



Photograph 2.7: Modhupur forest (a. Green view; b. Plantation of banana transform by cutting the *sal* trees).

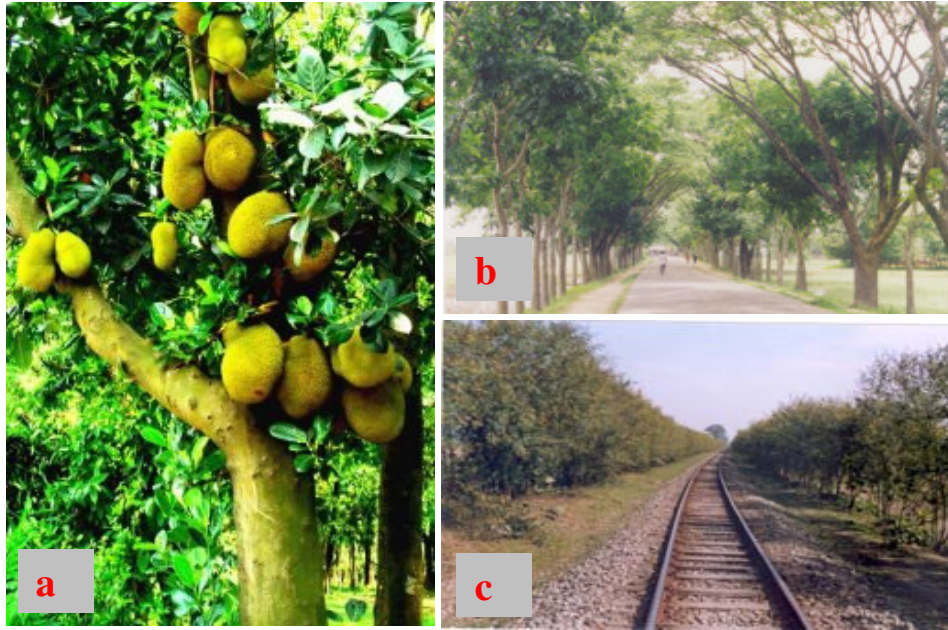
Source: (a) <http://www.flickr.com/photos/rahmanmm/2252494526>.
(b) <http://www.thedailystar.net/forum/2007/june/banana04.jpg>

Modhupur *sal* forest, has vanished in most part. According to the Forestry Master Plan completed in 1993 the *sal* forest in Tangail covered an area of 20,000 hectares in 1970. It shrunk to a piteous 1,000 hectares in the span of just 20 years. Once home to countless species including medicinal plants, fruit trees, uncultivated vegetables, herbs, creepers etc. has been transformed into gardens of rubber and fuel-wood, banana, pineapple, and papaya by illegal encroachment by the influential people in the locality. The towering *sals* of that time are all gone now. Recently government declared this forest as protected areas.

2.B.1.6 Woodlots, agro-forestry and social or community forest areas in peri-urban

Peri-urban areas in Dhaka city are mainly dominated by the agricultural activities. Most of the people living this area are poor. Therefore, agrosocial or community forestry is new in forestry practice mainly these areas. It, as the name implies is the practice of growing forestry on the homestead small to large area, village roadside, railway side etc. by a participatory approach. Share goes to the participating members. It's main goal are to meet the needs for fuelwood, small timber, bamboo, fodder and other minor forest produces on sustained basis, provide employment opportunities to the rural population and often, to improve aesthetic

value of the area and to meet the recreational needs of the population. The outskirts of Dhaka city mainly, Savar, Gazipur, Tangail, Narayanganj, Manikganj areas are mostly dominated by these types of forest area. Agro- forestry practice is also dominant here. Enhance tree and crop production at the same time are the main motto of this forestry mainly for the food security.



Photograph 2.8: Social or community forestry in the peri-urban area of Dhaka city (a. Jackfruits tree in homestead garden; b. Roadside trees under social forestry scheme; c. trees along the railway).

Source: (a) <http://dhakadailyphoto.blogspot.com>.
(b) and (c) www.dhakacity.org

Besides, the plantations under social or community forestry, some areas of the peri-urban areas have woodlots, which purposes are to produce fruits and timber.

After the above discussion, it can be summarized that although there are different forms of green resources exist in and around Dhaka but the reality is that as a whole, green areas are not adequate for the first growing mega city. An ideal city needs 20 percent areas covered by trees whereas Dhaka belongs only 8 percent green area (www.thedailystar.net/2003/06/11). In addition, most of the green areas are now under in threat due to urbanization, accommodated huge migrants, lack of proper planning and awareness of their benefits. Besides grabbers, encroachers and private builders, in some instance, government agencies have misused parks for revenue earning motive. The parks and playgrounds that are still left are precariously waiting to be swallowed by any one of the numerous predatory moves masquerading as ‘development projects’.

2.B.2. Greening Administrations and Activities

Once the present Dhaka city forest and green areas were managed by the Forest Department, but after the establishment of Dhaka City Corporation (formerly named Dhaka Municipality), it is the main responsible organization for greenery activates. Besides, the *Rajdhani Unnayan Kartripakkha* (RAJUK) had been emerged in 1987 through the ongoing crisis of planned and controlled development of Dhaka City which prime intension was to develop, improve, extend and manage the city and the peripheral areas through a process of proper development

planning and development control. The jurisdiction of RAJUK includes the City of Dhaka and its vicinity in the Districts of Dhaka, Narayanganj and Gazipur covering an area of 1528sq. kms. With DCC and RAJUK, a number of state bodies, autonomous bodies, private organizations, NGOs, different societies are involved with greening activities in and around Dhaka city. Of them, the key state and autonomous authorities are Department of Environment (DoE), Local Government and Engineering Department (LGED), Bangladesh Forest Department (BFD), Dhaka Urban Transport Project Authority (DUTP), and Dhaka Transport Coordination Board (DTCB), Department of Archeology, etc. Apart from these, some NGOs like ASHA, PROSIKA, different financial organization, donor agencies such as ADB, World Bank are also taking part in greening activities in Dhaka city. Some social organizations like Society of Arboriculture, Bangladesh National Nursery Consortium (NNC) are also contributing their efforts for promoting greening activities.

The greening activities in Dhaka got impetus during the British regime. The British rulers took several attempts in earlier phase of the previous century to develop Dhaka as a beautiful capital city of Assam and East Bengal with adequate greenery. Most popular *Ramna* Park is a successful outcome of their endeavor. Some remarkable improvement was happened during the Pakistan regime. Street and avenue plantation, establishment of gardens, large area allocation tree plantation were the major activities at that time. After the independence in 1971, greening activities have not got any importance rather than other wide variety of urban development projects including sanitation, drainage, housing, and infrastructure. The first Master Plan of Dhaka was prepared in 1959 by a British firm. The Plan covered roughly 830 sq. km (320 sq. miles) with a target population little over 1 (one) million assuming an average annual population growth rate of 1.75% in the city areas. The Plan in general, suggested a broad planning principle and zoned the urban area accordingly for various activities. Protect urban trees, rehabilitate what has been destroyed, and plan for enhancing green resources were some key policies in this plan but unfortunately, there were no mentionable development that happened under this plan due to lack of financial resources, government unwillingness for allocating money, coordination of the activities of different organization etc. Although, the Plan was prepared for a period of 20 years (1959-79) but it lasted almost double till the enforcement of new plan in 1995.

In 1995, Dhaka Metropolitan Development Plan, 1995-2015 was prepared for overall development of the city and its surrounding. The plan addressed Dhaka's urban planning issues at three geographic levels: sub-regional, urban and suburbs. This plan, indeed, a mile stone, for city greening with the aim of creating green areas compatible and functional for urban design and meeting the basic needs and values of local communities. Another remarkable planning policy is the National Forest Policy, 1994, prepared by the Ministry of Forest, which included multipurpose objectives for afforestation, social forestry, protected area management, etc. through the coordinated efforts of the government and NGOs and active participation of the people in order to achieve self reliance in forest products and maintenance of ecological balance. A 20-year strategic visionary plan then dubbed the 'Dhaka Environment Programme' which has been devised by the DoE for the improvement of the city's environment including strategies and approaches to establish a 'Green Dhaka'.

Though some form of greening activities were carried out in different times, indeed, it has got priority very recently. DCC has taken initiatives for beautification and greening of Dhaka city by planting trees in existing parks including establish new parks, play grounds, constructing fountains and other installations at various intersections/ roads and maintenance of 67 road medians and islands for a four-year term. Beside, unpaved parts of roads and footpaths are

used for the plantation of decorative plants and shrubs. The implementation of the project is running by the Beautification Cell of DCC involved with large number of banks, educational institutions, hospitals and business organizations. Dhaka Urban Transport Project (DUTP) and Dhaka Transport Coordination Board (DTCB) have also taken different actions to make the city roads beautiful and decorated, with the support from different organizations. Another activities are carrying out under the project named 'Good Governance and Development' by linking all Ministries, Departments and Agencies. Bangladesh National Nursery Consortium (NNC) and Horticulture wings of Agriculture Ministry are continuously trying to promote nursery and gardening activities in the city. Prime Minister's Award for afforestation and Tree fair introduced in 1992 and 1994 respectively in nation wide for creating awareness and inspired the people for tree plantation. Both programmes are yet continuing.

Some local NGOs are putting their huge efforts along with the forest department for afforestation under the agro-forestry and social or community forestry programme near the peri-urban areas of the Dhaka city mainly for economic benefits to the poor people. On other hand, some NGOs who are mainly working for environmental development of city, are also trying to create awareness of the city dwellers about the benefits of the trees. Donor agencies like ADB and FAO are contributing financial support to the government for improving the overall forestry sector of Bangladesh. Table 2.4 summarized the different greening activities in Dhaka city taken by the mostly involved organizations.

Table 2.4: Greening activities taken by the different organizations in Dhaka city.

Organizations \ Activities		Trees plantation	Nuisances pertaining to trees	Management of different types of graveyard, play ground,	Beautification	Establishment and management of parks	Nursery	Conservation of historical places	Afforestation	Promoting social forestry	Protected area management	Awareness rising	Forestry related research
State, local and autonomous bodies	DCC	√	√	√	√	√							
	RAJUK			√		√							
	DoE				√								√
	BFD								√	√			
	DUTP	√			√								
	DTCB	√			√								
	DoA							√					
NGOs and different voluntary organizations	ASHA	√					√		√	√			
	NNC	√					√		√	√			
	NISORGO										√		
	Other local NOGs	√							√	√			
	Society of Arboriculture											√	√
	BAPA											√	√
Educational and research organizations	Universities and other research organizations												√

Although there are lots of activities are carrying out by the different organizations, the changes are not remarkable stages. Lack of the implementation of planned policies, systematic and integrated approaches to the management of trees in the modern urban environment, and absent of designated autonomous parks and landscaping department are the mentionable causes for fading Dhaka city. Moreover, corruption in different state bodies is causing slow progress or to some extent no progress for implementation of different plans.

Recently government is trying to involve private partnerships such as financial contribution and voluntary participation of business and social bodies. This is, no doubt, will increase the capacity for enhancing greening endeavors of Dhaka city in future.

CHAPTER THREE

PROBLEMS, OPPORTUNITES AND CHALLENGES OF UPFG IN DHAKA

3.A Problems of UPFG in Dhaka city

From the analysis of green resources and greenery activities in and around Dhaka city in the previous chapter, it can be easily explicable that the green resource is unorganized with different forms, pattern and performance. Like other cities in developing countries, Dhaka is encountering a litany of physical and institutional constraints to greening endeavors. Limitations also exit in planting efforts and management inputs. Though government is trying to balance different conflicts and to ensure the community's needs for green resources, unfortunately, such chances are mostly being slipped away. Some of the major problems associated with UPFG are discussed in below:

3.A.1 Population and development pressure

Dhaka city is becoming faded with rapid expulsion of the trees through introducing different types of land uses as responding to rapid urbanization. As city's population is increasing tremendously, land becomes more extreme to accommodate excessive population. Only Dhaka city accounts about 38% of the total urban population of Bangladesh. The growth rate of the population during 1974-2000 was 6.9% (UN, 1998). There is no city in the world, which has experienced such a high growth rate in population during this period. The United Nations (1999) describes the rapid population growth of this city as 'exceptional'. The growth rate of Dhaka City's population will also continue to remain high and it is expected to grow at a 3.6% annual growth rate during 2000-2015 and reach a total population of 21.1 million in 2015. Table 3.1 shows the population and areas changes in Dhaka city during 1901-2001.

Table 3.1 Changes in Area and Population of Dhaka during 1901-2001.

Year	App. Area (sq. mile)	Total Population
1901	10	104385
1921	12	137908
1941	12	239728
1961	26	556712
1981	155.4	3430311
1991	522.34	6950920
2001	590	10712206

Source: *Tawhid, 2004.*

From the table it is depicted that the area of Dhaka city has not been expanding proportionately with the population during that time span. For accommodate the huge population, the city now includes the surrounding areas of Gazirpur, Savar, Narayangong, Bandar thanas (BBS, 1997). Understandably, these additional people have created tremendous strain on the urban utility services and other amenities of urban life. This has resulted in an adverse effect on the urban environment and valuable green area has been transformed into the built-up area.

The demand of satisfying the basic needs takes precedence rather than greening activities. Most of the city authorities are busy most of the time to give service facilities to the people

rather than think about green resources. Therefore, it can be said that population pressure is the main constrain in future greening process in Dhaka city.

3.A.2 Transformation of land use

Due to population pressure, the city has been expanded towards north and eastern direction and rapidly built up. With this spatial development of the city, wide roads and other paved areas replaced the unpaved areas, natural depressions, and agricultural land. In many cases, open areas and vegetated areas were filled up for development works not in any planned manner. No solemn effort at reclaiming land under a well-planned scheme to confer the city a homogenous and cohesive growth is evidenced. Most alarming scenario found is the open space reduction. In 1982, the total open spaces including the agricultural areas accounted about 60.69 percent (Ministry of Land, 1982) of the total land area of Dhaka mega city, where as it was only 21.57 percent in 2005 (SDNPBD, 2005).

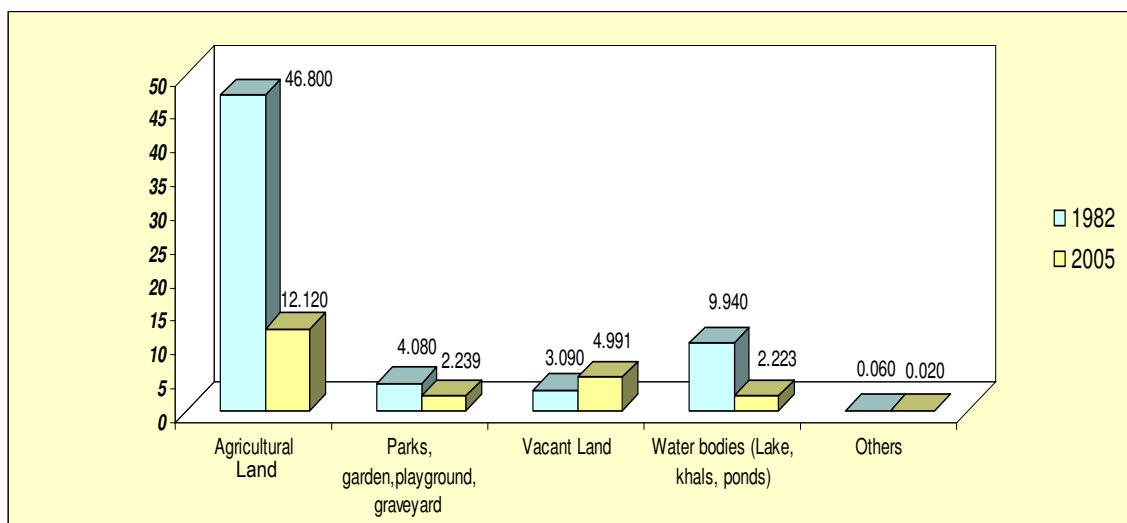


Figure 3.1: Changes of major types of open spaces during 1982-2005.

Source: Calculation based on the data from Ministry of Land, 1982 and SDNPBD, 2005.

It is illustrated that during the last 23 years open spaces has been shrunk about 49.12 percent and transformed into other types of land use mainly residential and commercial uses. For instance, the open space of *Paltan* has shrunk considerably after the hockey stadium was set up to make. In the diminution of *Paltan Maidan*, Dhaka has also lost a part of its heritage. Though it is seen in the above figure that vacant land has increased very little amount of percentage, it has mainly happened due to taken under consideration of surrounding peri-urban area under the jurisdiction of RAJUK. However, the present status of green areas such as parks, garden etc. in Dhaka city demonstrates that the development of the city did not succeed to fully meet the requirements of green areas of a mega city. Absence of adequate parks, open water bodies, and drainage system has degraded the quality of living in the city in many ways.

3.A.3 Loss of key green resources

During the last 30 years, the forest areas near the Dhaka city have been decreased remarkably (Table 3.2). Population pressure is the main underlying cause of forest depletion. Attitude to increase cultivable areas by clearing out vegetation covers has the detrimental effects on green resources in and around Dhaka city. Moreover, fire-wood collection by the increased

poor populace for cooking and dependency on forest products for various purposes exerted huge pressure on the green resources.

Table 3.2: Changes in area of important green resources.

Name	Year	Area
Ramna Park	Under British period	80 Acr
	2005	68.50 Acr. (with lake)
Modhupur National Park	1974	9013 Acr.
	1984	8436 Acr.
Modhupur Sal forest	1970	20000 ha.
	1990	19000 ha.

Source: ESCAP, 2005.

Besides, the ways in which public authorities develops, assigns land creates conflicts of interest. On the other hand, when the authority approves non-designated use to existing land it comes in contradiction with its own roles; for example, one of the largest open spaces in Dhaka, *Suhrawardy Udyan*, no longer remains a park as more than a half of the area was taken under clear cutting of tree for an unfinished project of monuments of the war of independence. Recently government has taken another decision to handover 25 acre area of this park to a private club for developing a golf course for their club members. It has been seriously criticized by the experts and environmentalists for such improper decision to transform large public green areas used by the city dwellers to private spots field (Box 3.1). This is only one example is presented here, indeed, a number of examples exist on green areas depletions in Dhaka city.

BangladeshNews.com.bd

Withdraw decision, demand experts, environmentalists

Withdraw decision, demand experts, environmentalists

2007-11-10 02:17:15

Urban experts and eminent personalities have strongly criticised the government move to hand over a huge chunk of land at Suhrawardi Udyan to Dhaka Club for developing a golf course and demanded immediate cancellation of the decision.

They described the move as “improper” and “unacceptable”.

The 64-acre ground, which has immense historic importance, has been an open public space for a long time but the government has decided to hand over 25 acres of land to the private club for developing and maintaining a golf course there.

Box 3.1: Protest against the loss of green areas.

Source: www.bangladeshnews.com.bd

The selection of trees for parks, roadside, residential areas is neither free from debate related on depletion of green areas within the city. Most of the road sides, plants with blooming flowers are planted along with different types of herbs and grasses. But the flowers can not

survive the strains of heat from exhaust pipes of the vehicles and the poisonous gases emitted. Having gathered much dust on them the flowers soon lose their beauty and wilted. The watering of the plants is also a matter of concern. Now fresh water from the WASA amounting to thousands of gallons is used to irrigate the plants on the roads. It causes a heavy taxation on fresh water. In this backdrop, use of surface water was suggested but for reasons unknown it could not be incorporated into the present plan. Plants along the streets are supposed to be a permanent feature of the city life. But the use of fresh water for irrigation, which is likely to aggravate the existing water crisis, cannot go for an indefinite period.



Photograph 3.1: Poor condition of roadside trees due to wrong selection of tree species.

Source: Courtesy by Al-amin, 2008.

Most of the playgrounds are in a poor condition due to the lack of maintenance by the DCC. Most of them are uneven having no grass. Dotted holes are also there in different parts of most of the playgrounds making them almost unusable. Some times trees are planted around the walkway and surrounding the playgrounds, but most of them are uprooted in the absence of monitoring by the authorities concerned.

3.A.4 Lack of proper planning and implementation

Lack of proper planning, weakness in the existing planning for development, negligence of the authorities for implementation of regulations, and poor motivation and communal awareness are major reasons for failure of urban authority to preserve the right of way over the existing green areas, even other open spaces like wetlands, *khals* and rivers. On the other hand, the laws and regulations for planning and development of Dhaka City are very old and in most cases outdated in terms of present development, control and needs (Islam, 2001).

Development of township in the metropolitan capital is regulated by the Town Improvement Act (TI Act) of 1953. Under the Act, the RAJUK has been empowered to prepare a master plan for the city that should guide all future developments. There are two master plans for the city which were drawn up at two different periods but never adequately followed. It is incredible that although the master plans were formulated as long ago as 1959 and 1995 respectively, these never acquired the shape of functional detailed plans for green areas. Last

plan (Urban Area Plan for Dhaka city 1995-2015) has kept some provision for creating open spaces (Appendix 1) but this plan exists in paper only. Different stakeholders ranging from the government's own utility agencies to private developers felt no compulsion to adhere to guidelines stated in the master plans because these lacked the force of implementation or enforcement.

The Government of Bangladesh (GOB) formulated and adopted Environmental Protection Act and in pursuance of this Act, the Rules for Conservation of Environment was formulated and adopted by GOB in 1997. The National Environmental Management Action Plan (NEMAP) prepared by GOB provides policy framework to link all development activities with environment for improving quality of life. But the long-term practice of not implementing the laws has encouraged certain bad practices that render depletion of green areas. Green areas within the city area are mainly control by the environmental Act in Bangladesh whereas out side of the metropolitan areas follow the forest Act. Indeed, at present there is no specific law for green areas except the Public Park Act, 1904. Different type of Environmental related polices and laws adopted in Bangladesh are given in Appendix 2.

A large number of national government ministries, directorates and agencies as well as municipal and other government agencies and the private sector were involved in the development of Dhaka. Their responsibilities were often not clearly defined and sometimes they overlapped. Most activities related to land management (such as town planning) were regulated and implemented by national government agencies and Dhaka City Corporation felt that its, presently limited, influence over the development within its borders should be increased.

3.A.5 Financial constrains

The lack of funds is a serious constraint for enhancing greening activities. Within the city area, DCC provides services to its residents. But Most of the cases DCC allocate maximum amount of money in its budget for utility services development. Green areas such as parks, play ground, graveyard development get very little attention in DCC's annual budget. The corporation allocated Tk 2.50 crore (25 Million Bangladeshi currency) in its budget for the current fiscal year (2007-2008) for the development of city parks, open spaces and playgrounds (<http://www.bangla2000.com/News/Archive/Business/6-30-2000/news>) which is only 0.8% of its total budget. Most of the time DCC's own funds is not able to keep pace with the incremental rate of urbanization, fast-growing population, and increasing demand for its services. Therefore, DCC cuts down some budget from its less priority agenda. Thus, the annual green areas development or plantation targets cannot be reached.

3.A.6 Lack of public awareness, education and research

Most people of Bangladesh are poor and illiterate. There is serious lacking of public awareness about the necessity and environmental, social and economic benefits of trees. Therefore, they don't hesitate cut the trees and their poverty encourage them to do it. Not only the general public but also the Government Authority sometimes occupies the open spaces to save the cost of land acquisition for developments works. Education and research gap on urban greening are another problem for future greening activities.

3.B. Opportunities for promoting UPFG in Dhaka City

Nevertheless, the above mentioned problems, there are ample opportunities to promote UPFG in Dhaka city, to some extent by following western UPFG conceptual framework including the full complement of quality-of-life necessities, amenity space and ecological habitats for vegetation and wildlife. The time to start the putting of a hard brake on the unplanned growth of Dhaka was crossed long ago. The major opportunities for UPFG are presented below:

3.B.1 Protection and maintenance of existing parks and other green areas

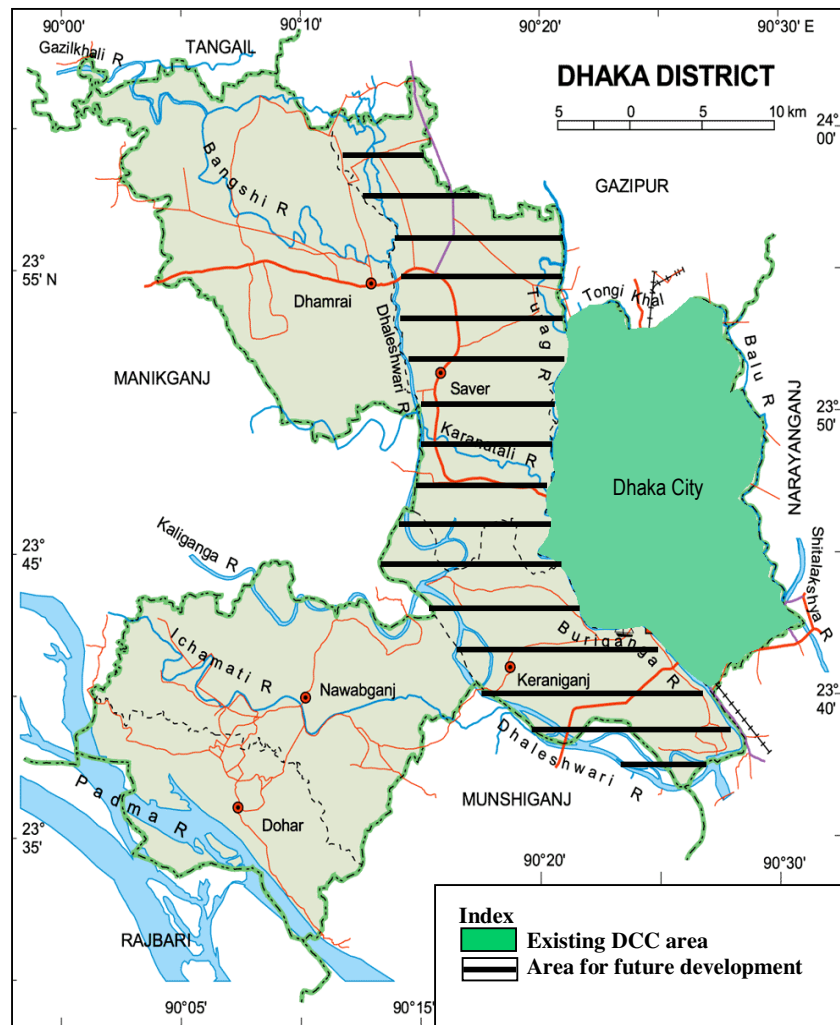
A continuous green structure is one of the main elements of an environmentally friendly city or town structure. At present, there are only 8 percent land of the total area of Dhaka city are urban forest which comprises different types of green area like parks, play ground, graveyards, nursery, etc. Statistics shows that one person can get only approximately 8 Sq. meter open space in Dhaka city (Uddin, 2006), which is really inadequate for living in a city. If it is count the people living in illegally in the slum areas and floating people around the city then the distribution of open spaces will be less than this amount. Indeed, these small areas represent a source of vitality for city dwellers. Green in city's built up areas should be considered the most effective, spatial, protective, healing, and decorative element. There is no alternative, at least, to keep up the Dhaka city in future without protecting the existing green areas.

3.B.2 Establishment new small parks play grounds, garden in expanding areas of the city

DCC has taken initiative to expand its jurisdiction area for accommodating the ever-increasing city population. RAJUK already prepared an Urban Area Plan 1995-2015 for Dhaka city in which they proposed to extent the city on north and eastern direction (Appendix 1). Therefore, both DCC and RAJUK have taken the surrounding municipalities into their command areas. Savar, Karaniganj and some part of Narayanganj Municipalities now are under the DCC areas (Map 4.1). These areas can be taken into consideration for establishing new small parks, play grounds, botanical garden by governmental mainly the DCC planning policy.

On the other hand, there are also some opportunities exists to promote green areas in residential and commercial premises in this area. As it is very difficult for DCC to ensure development activities like new housing, commercial centers etc. that's why DCC has given stress on private sector real estate development. It is a recognized fact that the health of the Real Estate Development Sector is the barometer of the National economy. In Bangladesh Real Estate Business started in Dhaka in late seventies. During 1970s there were fewer than 5 companies engaged in this business. In 1988 there were 42 such developers working in Dhaka and now in 2004 there are about 250 companies engaged in this business (<http://www.rehabhousing.com/search/siteSearchAction.do>).

Most of the real estate companies are carrying out their land development projects in the surrounding areas of DCC. And it is a positive sign that these housing companies have kept some provisions for green areas like small parks in the housing areas, green commercial premises. Though it is their business policy to attract the customer, ultimately it is contributing to establish some form in green areas.



Map 3.1: Present and future command area of DCC.

Source: www.banglapedia.net/Maps/MD_0156.GIF

In this context, DCC can enforce some bylaws for the housing and land developer companies that every company must have to allocate satisfactory amount of land for green and open areas.

3.B.3 Encourage rooftop gardening activities

Rooftop gardens are man-made green spaces on the topmost levels of industrial, commercial, and residential structures. They may be designed to grow produce, provide play space, give shade and shelter, or simply be there as a living, green area (<http://faculty1.coloradocollege.edu/~shall/ev421/joekurland.html>). Rooftop gardens are a smart way to use the available city space. They add another dimension of green space to an urban scape without taking up an extensive area of land in densely populated places. Developing the gardens at the rooftops of houses can help city dwellers economically beneficial to have not only fresh fruit and vegetable but also fresh air to breath sign of relief. It will create nice surroundings in the area that would give them much pleasure and also improve city environment and healthy living. In some European countries such as

Switzerland, bylaws have been approved that new buildings must be designed to relocate the greenspace covered by the building to their roofs.

As the condition of crowded Dhaka city is beyond imagination, it is very hard to find out new quality sites for tree plantation. Recently building infrastructure has been changed and within the built up areas most of the buildings are multistoried and high rise in nature. Therefore, city dwellers can take a simple and easy initiative to make all roof tops green by planting different trees (fruit trees, vegetables, etc.) or practice gardening. It is a positive that recently some environmental awareness raising voluntary organizations have taken initiatives to citizen involvement for increase roof top gardening. Already a society has been formed named Bangladesh Green Roof Movement. Jointly cooperated with Idcol a NGO, this society has taken a gardening project at the rooftops of 111 houses in the DCC area. This is a pioneer leading initiative, would be an inspiring example for the dwellers of the other part of the city to take such benefit. Another scheme has taken by the Dhaka Journalist Housing Cooperative Society. They plan to make all the roof of their housing society green by gardening.



Photograph 3.2 : Roof top gardening in Dhaka city.

Source: www.flickr.com/photos/trimplimit/.../in/set-

Therefore, government should appreciate those initiatives and consider proper planning policy to motivate citizen of the Dhaka city for planting fruit plants and vegetable in their rooftops. Appropriate technical support and cooperation between different organizations might be explored for promoting and popularize roof gardening, an alternative ways of urban greening in Dhaka city.

3.B.4 Strengthen city beautification programme and increase avenue plantation

The programme “Beautification of Dhaka City” was launched in 2004. This beautification work carried out under DCC with the help of public organizations. About 105 different sections of roads and street intersections were taken under beautification and maintenance until March 2008 (The New Nation, 2004). The organizations completed the beautification work at their own costs without any financial assistance from DCC.

Also in accordance to the theme of the World Environment Day 2005 “Green Cities-Plan for the Planet!” the government was taken another initiative for the beautification and greening of Dhaka city through tree and flower plantation. Beside plantation of trees and flowering

shrubs, water fountains and sculptures have been constructed at various intersections/ roads of the city. Some positive results of their efforts can be seen along the Airport Road, Sangsad Bhaban and various important intersections and parks and so far, the beautification drive has made a positive impact on the people of Dhaka. The living conditions in Dhaka city has improved considerably despite the high density of people. Both private and government organizations have to be given credit for their role in the beautification of the city. The past year has heralded a new look for Dhaka city which is now more aesthetically agreeable and environmentally sound. More efforts, continuing and strengthen such beautification activities and basic awareness programs can convert Dhaka from an urban jungle to a garden city once again.



Photograph 3.3 : Dhaka city beautification (a. Landscaping along the Airport Road b. Decorative Landscape and water fountain on Manik Miah Avenue).

Source: *Bangladesh State report of Environment, 2006.*

Apart from the city beautification programme, most of the avenue should be taken under huge tree plantation. At present, almost every avenue has some trees; proper maintenance with additional planting efforts should also be given for future greening process.

3.B.5 Strip plantation and afforestation in different land uses of the outside of DCC

The main obstacle for greening in Dhaka city is need for new plantation sites. But there is wide range of possibility utilizing the river, wetland, road and rail ways sides under greening programme.

Table 3.3 : Different land use of DCC.

Land use	Total	Length in Km
River	18	328
Metal road (Built with bricks, stone, concrete etc.	535	941
Semi Metal road (Built only raw bricks)	100	420
<i>Kutch</i> a Road (Only soil, no bricks)	601	1949
Rail road	4	25

Source: *BBS, 1998.*

For example, there are 16 rivers having 328 km lengths is flowing inside and out side the district (BBS,98) which can be consider under greening Most of the riverbanks have been used as garbage dumps and are unsightly. Planting these areas with various forms of vegetation cannot only prevent use of the banks for waste disposal, but can also make them aesthetically more attractive, help in flood control, and create more biodiversity. Similarly, all kinds of road side can be taken under tree plantation. In 2005, under the Forest department about 22 km road side has been taken under strip plantation in Dhaka district. Indeed, this can be regarded as greenways of Dhaka city in future.

Wetlands merit can be considered as a priority for greening programme. There are number of wetlands exist near Dhaka city. Thus, rather than draining, dredging or filling wetlands, city planners need to appraise these important ecosystems for their value as a protected resource and take afforestation programme surrounding the wetlands. Urban greening programs need to take advantage of all the benefits wetlands can provide by creating new ones. Moreover fellow land can be included new afforestation programme. Small woodlots can be also created in these lands.

3.B.6 Promote nursery

Around 1,200 big and small nurseries are currently operating in Dhaka, its outskirts and neighboring areas. About 500 of them are exclusively growers who sell the plants to others. The nurseries are providing employment for a huge number of people migrating from all over the country to the city in search of livelihood. New jobs like plant suppliers and caretakers have been created in offices and apartments buildings. Educated young people are joining the business. Plants in pots and floriculture are now a popular trade in Dhaka city.

Though the trend started in 2005, the problem is that the nursery business has come a long way without any support from the government. Another important problem is that nurseries do not have any protection against natural calamities as most nurseries are developed out in the open with a small investment. When a calamity ruins the production, owners cannot get monetary support from any side. Therefore, promote nursery in outskirts including Gazipur, Savar and Ashulia, in every neighbourhood, could be a part for UPFG development in Dhaka city. It can, in one way, accelerate the greening process, in other way; provide economic benefits for the poor as one of the benefit of UPFG.

3.B.7 Peri-urban areas have an opportunity for agro-forestry/Social forestry

The development of UPFG in Dhaka city can be extended to the prei-urban areas. Considering the area of Dhaka mega city (1353 Sq. Km) which is included the area of some parts of few districts like Narsingdhi, Gazipur, Manikgonj, Narayangonj, Munshigonj etc, there is a possibility to create new woodland around the peri-urban areas (Uddin, 2006). As the major dominant land use of the peri-urban areas is agriculture, therefore, agro-forestry could be possible form of greening in this area.

Table 3.4 : Rural and urban area of adjacent districts of Dhaka.

Name of the District	Area (in Sq. Km), 2001		
	Rural	Urban	Total
Gazipur	1265.92	475.61	1741.53
Manikgonj.	1120.30	258.27	1378.57
Narayanganj	440.46	247.03	687.76
Munshiganj	689.54	265.42	954.96
Narsingdhi	1062.16	78.60	1140.76
Total	4578.38	1324.93	5903.58

Source: ESCAP, 2005.

Most of the districts have higher rural area than their urban parts. As we consider this area as peri-urban area of Dhaka thus, it can be possible to introduce agro-forestry programme in the rural part of these districts. Already a pilot agro-forestry research and demonstration was implemented by the Forest Department in the *Sal* forest areas. The project had been developed precisely to design/develop agro-forestry modules which is environmentally feasible, socio-economically acceptable enhance tree and crop production at the same time to uplift the socio-economic condition of the participants. The project aimed at using 120 ha of encroached *Sal* forest land of Dhaka, Mymensingh and Tangail Forest Division to develop suitable participatory plantation models. Similar programme can be taken in the other adjacent districts.

Another way for enhancing UPFG is the promotion of social or community forestry. The World Food Programme assisted the Government to develop Social Forestry as a national programme and the Government incorporated WFP assisted social forestry programme in its annual development plan from 1998. Poverty alleviation, economic rehabilitation of rural poor especially the destitute women of the society by engaging them in forestry activities, social uplift of rural poor and environmental improvement are the main objectives of this project. From 1990, 100 NGOs are involved in this programme and at present about 60 NGOs are continuing with the programme nation wide. Commencing from 1990 up to 1998 about 31 million trees were planted involving 0.062 million people directly and 0.62 million people indirectly. The Bangladesh Forest Policy 1995 also emphasized afforestation and social forestry in peri-urban and rural areas (Appendix 3). This social forestry programme should continue and integrate it into UPFG programme. It is expected that social forestry in the peri-urban areas of Dhaka city can also give the benefit of Dhaka mega city.

There are two national parks located in the prei-urban areas of Dhaka city. At present these two are mainly used for recreation and conservation of biodiversity at a same time. Government has considered these two parks including the Modhupur *Sal* forest as protected area. It will also be a good decision not only to protect but also take actions for future expansion of these areas by planting varieties of native plants according to site requirement.

3.C Challenges for UPFG

But now the question is what challenges should be overcome for sustainable UPFG development in and around Dhaka City. Indeed, it is by no means an easy task to promote UPFG within the existing situation and resources limit of Dhaka city. Inventoring and

monitoring, techniques of treatment, planning, implementation, funding and responsibilities are very demanding in this perspective. The following section mainly presents some main challenges for promotion and management of UPFG in Dhaka city.

3.C.1 Need for professionalizing UPFG concept and long term strategies

What is very important now is starting proper strategies for bringing UPFG concept under planning policies then formulate measures to marshal and coordinate their various activities towards achieving the objectives.

UPFG promotion needs both short term and long term planning and policy. Different present planning schemes which have kept some greening options therefore, should be implemented immediately and then take new concrete strategies.

3.C.2 Integration of UPFG with other urban development projects

Urban greening should not be considered as not worth mentioning project implemented in a metropolitan environment. UPFG is an integrated part of city, inextricably linked to the social, economic, and environmental setting therefore, equal importance should be given on UPFG activities by integrating into another wide range of urban development projects including health and sanitation, drainage, housing, infrastructure education and so forth. Such large urban projects hold much promise for quickly expanding urban greening in the city. On the other hand Forestry projects must encourage the reinforcement of local rural-urban linkages in a balancing mode that benefits both sides.

3.C.3 Improvement of green area Management

Adequate management system is essential to ensure sustainable UPFG for long run. The management system will be the composition of operation; maintenance; remedy and replacement. The responsibility for management of green areas is rest with DCC. The authority should develop a routine preventative maintenance program for the green areas so that the improvements will provide a lasting benefit. Scheduling of activities, methods and equipment, staffing needs and any appropriate re-organization, whatever needs should take in this context.

3.C.4 Need for a legal framework

As an over populated city, spaces are highly contested in Dhaka. Different social groups contend within themselves and with others for access to and control over urban space. The protection and enhancing of green space, either through urban planning or design, does not take place in an all-consensual and apolitical premise. In this regards, legislations have a great importance in the prevention of abuse of the urban green spaces that are a part of the soul of the city. At present there is no individual Act for urban forest except The Public Parks Act, 1904 which applies *'to any designated public park or garden. It empowers the government to make rules for the management and preservation of any park, and for regulating the use thereof by the public.'* (http://banglapedia.search.com.bd/HT/E_0066.htm).

Another important legislation is Bangladesh Environmental laws, which adopted to control environmental degradation. Other laws such as Constitutional Laws, has some legislation on urban open areas and environmental management, which some times overlapped and create contradiction for overall implementing. The dependency on the general legal structure and

the contradictory regulations that exist within some General laws are not enough for promoting urban forestry in Bangladesh. Therefore, a complete legal frame work for UPFG is urgent need and then legislations which will be formulated should put in force properly in future.

3.C.5 Financial supports

Development of multifaceted sustainable UPFG in Bangladesh not only entails local action by the government and other dedicated relevant organizations but also steadfast support and assistances from our international partners. Raising money and funding in kind is a major part of the work of UPFG initiatives.

3.C.6 Need for Education, Research networks, Communication and information-sharing

Education and research on forestry are very remarkable stages in Bangladesh and on going. But urban forestry has not yet been reached in scientific domain. Almost every city in Bangladesh has some form of urban greening already in progress, much more research and information sharing needs to be accomplished in this area. Although program should be designed to meet each city's particular circumstances, all metropolitan areas share some urban problem whose solutions may be similar.

3.C.7 Green structure Plan for Dhaka city

At present there is no green structure plan for the Dhaka city. Most of the western countries have already prepared green structure plan for their cities. Green structure plan is a useful tool to enhance the coherence of the built and green environment. Therefore, based on a balance between a development-driven approach and management aspects and by involving stakeholders participation a green structure plan should be prepared for Dhaka city.

4.1 Discussions

4.1.i Future implication of UPFG in Dhaka city: A possible Model

Well-planned and well managed green areas are essential for environmental and high quality of life for Dhaka city dwellers. What is very important now is starting immediate actions for transforming Dhaka as green a city whatever reformatory or new activities which may be possible. UPFG in Dhaka could follow UPFG concept which includes different types of urban forest location ranging single tree to peri-urban woodlands, forest and in some extent, peri-urban agriculture, as the opportunities suggested in the previous chapter. A model, thus, is developed below considering possible location of different types of green areas in Dhaka city under the UPFG domain in future. The model also includes necessary challenges what should be overcome.

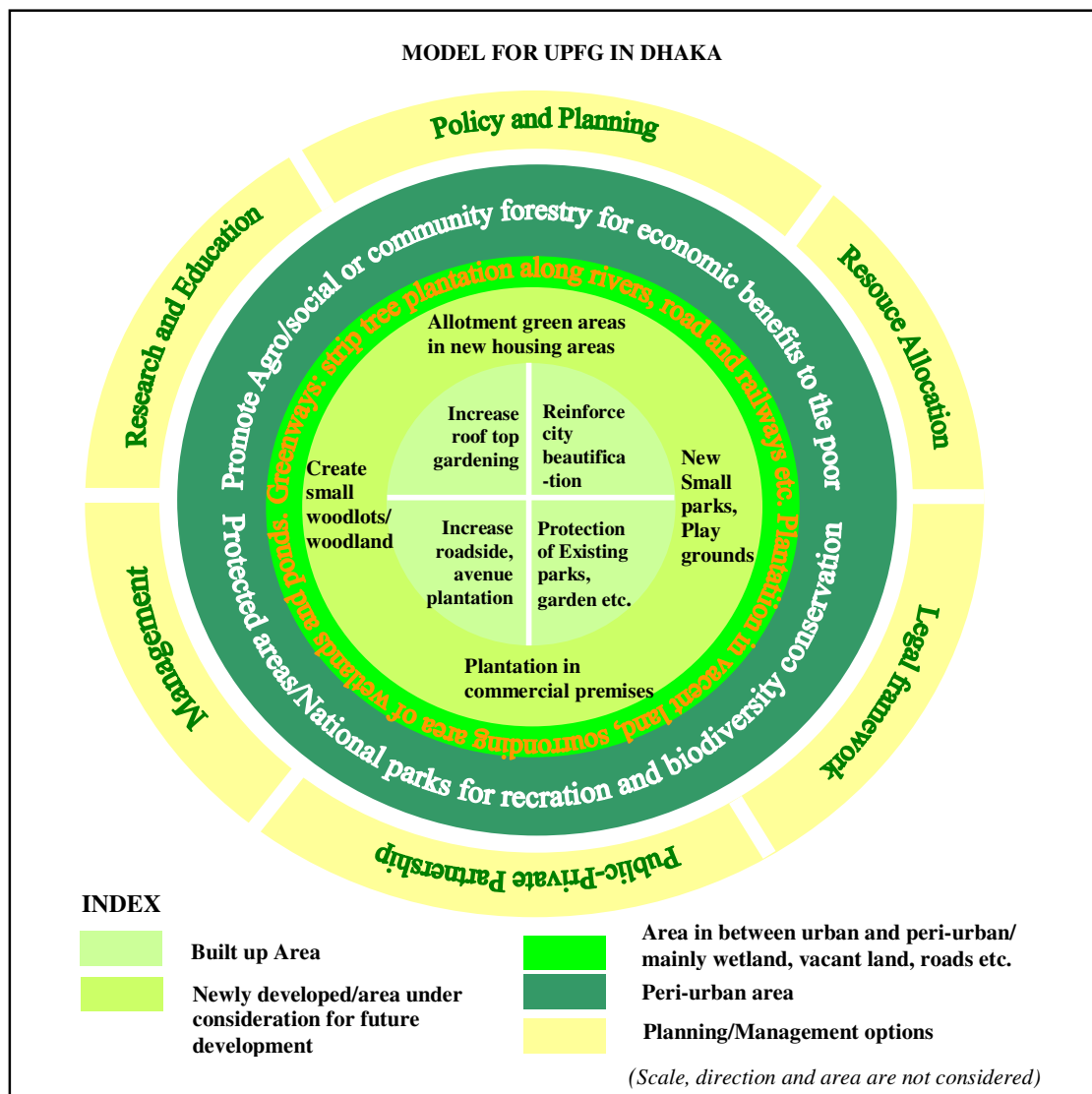


Figure 4.1: Possible model for UPFG in Dhaka city.

The need to provide quality planting sites, and to guard against subsequent degradation and intrusion, are the most crucial aspects of urban forestry planning in Dhaka city. Zoning can be very useful in this regard to select which area should be allowed what types of greenery in future. The model suggests that within the built up areas, existing green areas and other open space must be preserved. Increase the roadside and avenue plantation and encourage rooftop gardening are other suitable options to increase greenery. DCC taken city beautification programme should be also reinforced for aesthetic benefits of the city. During the last decade the city is being expanding in north and eastern direction. The Urban Area Plan 1995-2015 proposed by the RAJUK also kept provision to develop open space on the north eastern side. Recent experience shows that most of the land developer companies, mainly for housing and commercial area are spreading their development surrounding all sides of the built up parts of the city. RAJUK also extended its operation area taking under some part of surrounding municipalities. These newly developed areas may be very useful for establishment of new small parks, play grounds and to some extent, woodlands or woodlots. Housing company, commercial firms can also allocate satisfactory spaces for tree plantation in their premises. Since 1998 the strip plantation along roads, embankments, highways etc. in rural areas following the participatory mechanism in Bangladesh has got priority to governmental policy. This afforestation programme could be functional in the surrounding river, road side, railways around Dhaka city. Planting these areas with various forms of vegetation can prevent waste disposal, erosion, flood control and make them aesthetically more attractive and create more biodiversity. Indeed, this area can be regarded as greenways of Dhaka city in future.

As a developing country, where more than seventy percent people still engage in agriculture, no urban greening program would be complete without an urban agriculture component. The dominant land use in the peri-urban areas of Dhaka city is agricultural land. Agro-forestry in the peri-urban areas, in this context, could be the best way for enhancing green areas by tree and crop production at the same time. Alternatively, social or community forestry can be promoted with active participation of local community mainly poor people for their economic benefits. Both forms of forestry also contribute improve the overall environment of the Dhaka city.

The *Chandra* National Park is located very near to Dhaka city. Peoples visit this park for recreation frequently. This park should be protected from vandalism, tree felling and any kinds of pessimistic activities. Another, vast green areas adjacent to Dhaka city are Bhawal and Madhupur Sal forest, which are now considered as '*protected area*' for preserve ecological or biological diversity. These areas also serve as sanctuaries for birds and animals native to the area while providing limited access for recreation or other uses. High priority should also be given in future UPFG planning policy for proper management by legal protection. Considering these forest areas into urban greening programs will create a more sustainable bioregion in and around Dhaka city.

By following the UPFG conceptual framework, finally, the model also suggests that sustainable development of UPFG in Dhaka city needs planning and design, technical and management activities.

4.1.ii Facing the challenges: Some Recommendations

Sustainable development of UPFG and integration its benefits to country's overall sustainable development require courageous, constructive and strategic approach. As the concept of UPFG promotes inclusiveness by involving experts, policy makers, and stakeholders from all

walks of life, therefore, UPFG desires to be allied to a wide range of issues and agendas. Some recommendations are proposed in below:

- Consider the UPFG as a political, social agenda and put into planning process. Political parties should be committed not only to propose plans for UPFG in their election manifestos but also implement on going to their power what they included.
- Formulate appropriate, affordable and implementable policies for minimum standards of UPFG development taking into account the economic, social and physical dynamics of rapid urban growth. As there has already begun some form of greening activities collaboration with various ministries or other institutions, political and legal considerations can make it possible to share costs with both government and nongovernmental agencies and to work out creative ways for starting UPFG program in full paraphernalia.
- Strategies for protection of existing urban green areas, rehabilitate what have been destroyed, and plan for the judicious utilization of resources for sustainable development. Therefore, it is important to quantify UPFG related targets and integrate monitoring and evaluation systems to assess urban greening related indicators. In addition, it should be necessary to prop up and strengthen local initiatives in design, conservation and management of urban green areas through interactive participation of all stakeholders.
- Solicit funding from private and international sources. By developing guidelines, manuals and state-of the art fact sheets of good urban forestry practices; and then disseminates materials to private organizations, business companies and donor agencies. Collaboration with international organizations like FAO, ADB, World Bank etc. for financial, technical supports may enhance capacities and knowledge for development and implementation of national and local UPFG programs aimed at contributing to urban livelihoods. Besides, encouragement of local companies to sponsoring greening activities by linking their name to a local 'Green' initiative.
- Include a priority research programme for UPFG and promote the establishment of urban greening research and development networks at national, regional and international levels. An in-depth survey of the relative importance of the environmental and productive functions of UPFG for different social groups and ecozones could be done. Besides, development of curricula for multipurpose UPFG with regard to environmental and professional education and offer training opportunities to the managers are consequently necessary. Moreover, sharing experiences as well as information about what does and doesn't work in other countries can help the city planners avoid costly implementation and maximize scarce resources.
- Prepare a visionary sustainable Green Structure plan for Dhaka city but funding for the plan should be arranged beforehand.

4.2 Conclusion

The growing urban populations in and around Dhaka, of whom majority are living below the poverty level, have an imperative need for the basic necessities of a reasonable quality of life, adequate food, shelter, potable water and jobs. A good portion of these needs can be provided

through UPFG. It can hold out opportunity for food production, plod for housing, fodder for livestock, protected watersheds for clean water, sound recreational environments and a variety of entrepreneurial opportunities for employment. Additionally, green areas provide citizens aesthetically pleasing work and home environments, opportunities for recreation and education as well.

It may hope that Dhaka will be a green city where the rush to build does not stop the civilized and healthy need for trees and vegetation at every available nook and corner of the city, where buildings could be seen as pavilions in a garden. A well-planned participatory UPFG program can thus secure a healthy sustainable future for the urban populations of Dhaka as well as other cities in Bangladesh.

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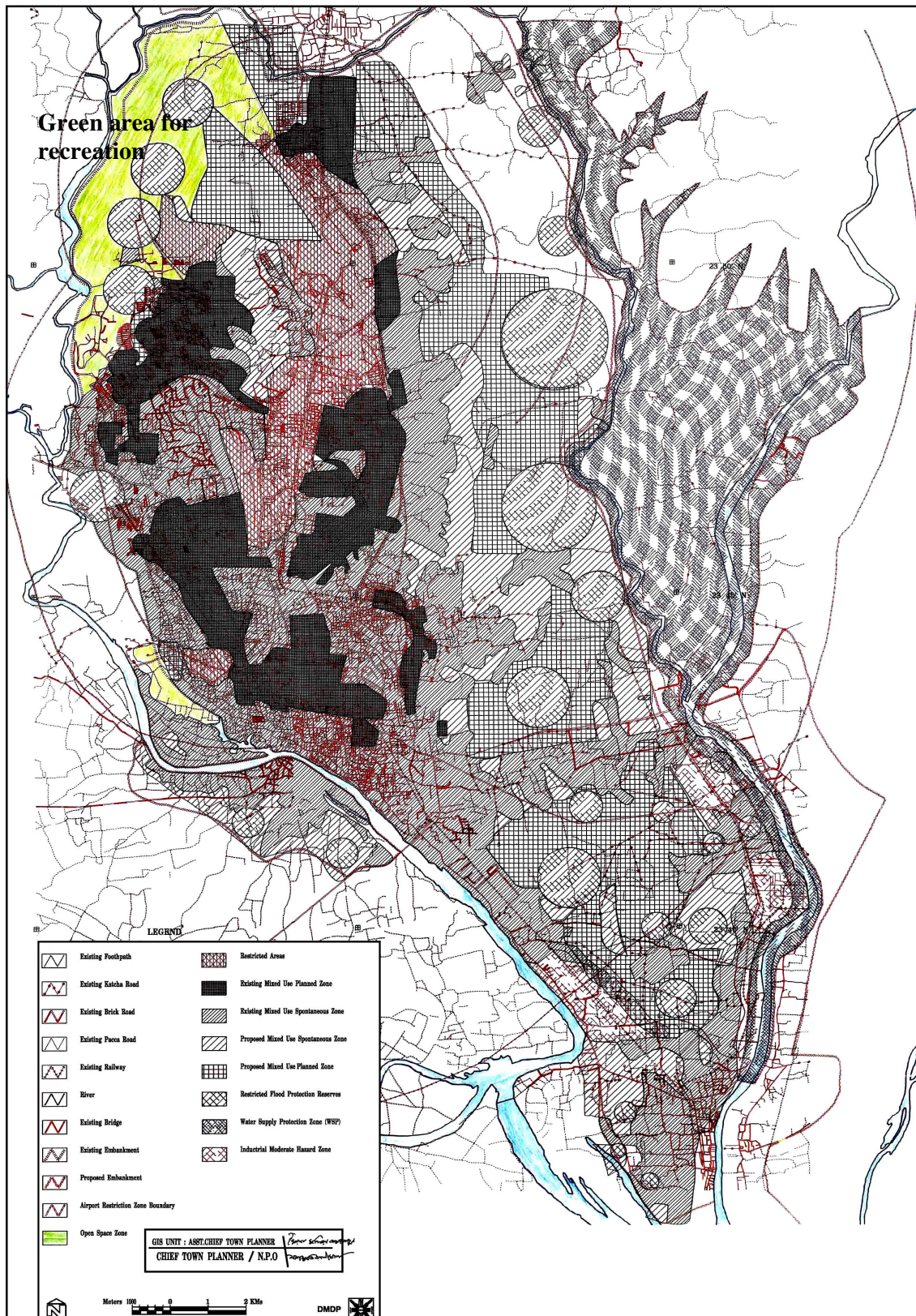
<http://faculty1.coloradocollege.edu/~shall/ev421/joekurland.html>

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http://www.banglapedia.net/Maps/MD_0156.GIF

Appendix 1

RAJUK proposed Urban area Plan 1995-2005 for Dhaka city



Appendix 2

Environmental Related polices and laws in Bangladesh

Law/ Act/ Guideline	Environmental component/sector
Master plan for solid waste management for Dhaka city (On process)	Solid waste management
City Corporation Acts/Ordinances	(all) inner city Environmental Management
The Public Parks Act 1904	Parks, Recreation Spots
The Forest Act 1927	Forest
Motor Vehicles Act, 1939	Air, noise
Town Improvement act, 1950	Land use
The Building Construction Act 1952	Construction of buildings/ houses
The Private Forest Ordinance 1959	Private Forests
Factories Act, 1965	Air, occupational hazards
Pesticide Ordinance, 1971	Agriculture
Bangladesh Wildlife (Preservation) Order 1973	Wildlife, forests
Traffic law, 1983	Air, noise
Irrigation Water Rate Ordinance 1983	Agriculture
Groundwater Management Ordinance 1985	Ground water
Brick Burning Control Act, 1989	Air, land
Environment Policy, 1992	Air, water, land, health
Atomic Security & Radiation Control Act 1993	
National Forestry Policy 1994	Vegetation
Environment Conservation Act, 1995	Air, water and noise
Water Supply and Sewerage Authority Act 1996	Water, sewage
Environmental Conservation Rules, 1997	Air, water and noise
EIA guidelines of industries, 1997	Air, water, noise
Dhaka Metropolitan Development Plan, 1997	Land use
Water Supply and Sanitation Act, 1998	Water and sanitation
National Fisheries Policy 1998	Water, aquatic habitat
National Water Policy, 1999 (approved)	Water
National Agriculture Policy 1999	Land use
Industrial Policy 1999.	Air, water
Environment Court Act, 2000	Air, water, land etc
Open Space and Wetland Protection Act, 2000	Land
Bangladesh Water Development Board Act 2000	Water, agriculture
Urban Water Body Protection Law 2001.	Water
Noise Control Act, 2004	Noise
National Water Management Plan, 2004	Water
Municipal Ordinance, 1977(amended in 1983)	Land use, water, solid waste management

Source: JICA, 1999; Huq, 2004

Appendix 3

National Forestry Policy 1994

Statements of the National Forestry Policy

□□ Attempts will be made to bring about 20% of the country's land under the afforestation programs of the government and private sector by year 2015 by accelerating the pace of the program through the coordinated efforts of the government and NGOs and active participation of the people in order to achieve self reliance in forest products and maintenance of ecological balance.

□□ Because of limited amount of forest land, effective measures will be taken for afforestation in rural areas, in the newly accreted char in the coastal areas and in the denuded nonclassified State Forest areas of Chittagong Hill Tract and northern zone of the country including the Barind tract.

□□ Private initiatives will be encouraged to implement programs of tree plantation and afforestation on fallow and hinterland, the bank of the pond and homestead land, which are under private ownership. Technical and other support services will be extended for introducing agroforestry on privately owned fallow and hinder lands to keep intact the production of grass and herb which is grown on government and privately owned forests and fallow lands.

□□ Tree plantation on the courtyards of rural organization such as Union Parishad, school, eidgah, mosque-moktob, temple, club, orphanage home, madrassa etc. and other fallow lands around can be initiated. The government will encourage this type of initiative and extend technical and other supports.

□□ Massive afforestation on either side of land surrounding road, rail, dam and khas tank through the partnership of the local people and the NGOs will be commenced. Side by side, rubber plantation will be encouraged in all suitable areas of the country including Chittagong Hill Tract, Sylhet and Modhupur.

□□ Special afforestation programs will be taken in every city of the country under the auspices of the government in order to prevent pollution of environment in the densely populated area. Municipal, town and other relevant authorities will take concrete efforts in implementing this program. Attempts will also be taken to ensure tree plantation/ afforestation while plans are made in respect of residential areas.

□□ The priority protection areas are the habitats, which encompass representative samples of flora and fauna in the core area of National Parks, Wildlife Sanctuaries and Game Reserves. Attempts will be made to increase the amount of this protected area by 10% of the reserved forest land by the year 2015.

□□ All state owned forests of natural origin and the plantations of the Hill and Sal forest will be used for producing forest resources keeping aside the areas earmarked for conserving soil and water resources, and maintaining the bio-diversity. Keeping in view the ecology, the management of forest lands will be brought under profit-oriented business.

□□ The areas under the reserved forest, which have been denuded or encroached, will be identified. Afforestation in these lands will be done through people's participation. In this regard, the use of agro-forestry will be encouraged. NGOs will have opportunities to participate in this program. Side by side, the lands in Chittagong and Sylhet, which were allocated to different persons and institutions for developing the tea gardens still remain unutilized and uncultivated will be identified and used for tree plantation and afforestation.

□□ Because of the scarcity of forest land, state-owned reserved forest cannot be used for nonforestry purposes without the permission of the Head of the Government.

□□ Funds from different donors including International Aid Organizations will be used to promote private forestry Organizations and tree farming, and for such programs like training, technical and financial supports will be imparted at an increasing rate.

□□ Women will be encouraged to participate in homestead and farm forestry, and participatory afforestation programs.

□ Ecotourism, related to forest and wildlife, is recognized as forestry related activity, which will be promoted taking into consideration the carrying capacity of nature.

□□ There will be massive campaign through the government and non-government medias for raising consciousness among the people regarding afforestation and conservation, and use of forest resources.

□□ Encouragement will be extended to grow fruit trees for producing more fruits along with the production of timber, fuel-wood and non-wood forest products under the afforestation programme.

□□ Initiatives will be taken to reduce wastage by increasing efficiency and modernizing the technology for extracting forest resources.

□□ Forest Department will be strengthened in order to achieve the goal and objectives of National Forestry Policy. A new department called "Department of Social Forestry" will be established.

□□ The implementation of National Forestry Policy will be supported by strengthening educational, training and research organizations. This will contribute to forestry sector development.

□□ Laws, rules and regulations relating to the forestry sector will be amended and if necessary, new laws and rules will be promulgated in consonance with goals and objectives of National Forestry Policy.

[Source: Bangladesh Forest Department, 2007]